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The peer-conforming behavior of high creative fifth-grade pupils was compared with that of low creative fifth-grade pupils in a controlled, small-group situation, in relationship to the nature of the task presented, the sociometric composition of the group, and any interaction of these variables.

Subjects of the study were fifth-grade pupils in a large, suburban, public school district. They were given tests of creative thinking and intelligence. They were also given a sociometric nomination form. On the basis of their scores on the creativity tests, two groups of target subjects were identified. These subjects belonged to the top and bottom tenths on creative thinking. Within each level of creative thinking, experimental target subjects were randomly assigned to six combinations of the two variables which were: visual perception and information tasks; and friend, neutral, and non-friend group compositions.

Experimental subjects responded under a group pressure situation. Control target subjects responded to the same tasks without group pressure. The evidence indicated that the creativity level of the children, the sociometric composition of the test group, and the type of tasks were associated with fifth-graders' peer-conforming behaviors in a small group situation when these variables were looked at in their interaction. Pupils' scores on perception tasks indicated that the creativity by group composition effects were significant. High creative subjects deviated most when they were with non-friends; low creative subjects deviated most when they were with friends. Both groups deviated least with neutrals. Information scores showed that high creative subjects deviated more than low creative subjects.

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Cooperative Research Project No. 2021
(October 1963 - March 1965)

Kaoru Yamamoto
Principal Investigator

at

Kent State University
Kent, Ohio

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
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CHAPTER I

INTRODUCTION

Problem

This project sought to explore the relationships between creative thinking of fifth-grade children and their conformity to peer pressures in a controlled, small-group situation.

It seemed to be generally assumed that non-conformity is one of the characteristic concomitants of creativity and, hence, that highly creative individuals are less easily influenced by group norms and standards than are less creative people. Some evidence favoring this assumption can be found in several studies (Barron, 1957; Getzels & Jackson, 1962; Roe, 1959; Torrance, 1959; Torrance, 1961; Torrance, 1962a; Torrance, 1962b) but the results of these research findings on the relationships between creative thinking and social conformity are merely suggestive and exploratory in nature. Systematic control of various external factors is seldom found in these studies and investigators' imaginativeness seems to fill in the gaps. In addition, an unspoken assumption that the majority is always wrong and independence is necessarily productive seems to underlie many contentions presented (Pepinsky, 1960; Pepinsky, 1961). Such an assumption should be questioned since "the concept of independence or non-conformity should be understood as relative, both to the situation and in degree" (Pepinsky, 1961, p. 128).

Do creative members always act independently of the group's decision or is their non-conformity specific to the nature of the task confronting the group? Does the composition of the group affect their behavior? Does the degree of agreement among other group members influence their judgment? These are some of the questions awaiting more precise investigations than the studies reported thus far.

The present study examined some of these untested propositions about the relationships between creative thinking and peer conformity among elementary school children through application of the "group-pressure experiment" technique.[1] To the author's knowledge, no study has been reported on the application of this technique to the area of creative thinking abilities among children. These controlled, small-group experiments were expected to clarify the functional relations under question and, in addition, pave the way for future studies of expanded scope.

Objectives

The major objective of the study was to compare peer-conforming behavior of high creative fifth-grade pupils with that of low creative fifth-grade pupils in a controlled, small-group situation, in relationship to (1) the nature of the task presented, (2) the sociometric composition of the group, and (3) the interaction, if any, of these variables.

---

[1] The "group-pressure experiment" technique refers to the one originating in studies by Sherif (1937) and Asch (1953). A subject is placed in a small group and exposed to social pressure from other members in terms of a consensus in judgment which is different from his own. The subject's reaction in the face of this group pressure is the object of investigation.

Throughout this study, "creative thinking abilities" or "creativity" meant those abilities measured on the specific pencil-and-paper tests employed and expressed accordingly by pupils' "total" scores on these instruments. "High creative" pupils were identified as those who, in the specific grade, belonged in the top ten per cent on creative thinking abilities and "low creative" pupils, as those who belonged in the bottom ten per cent on these abilities.

The hypotheses tested in this study were stated in their null form as follows:

1. There is no difference between high creative pupils and low creative pupils in relationship to their peer-conforming behavior in a small-group situation.
2. Regardless of their creativity level, pupils' peer-conforming behavior is not related to the nature of the tasks presented in a small-group situation.
3. Regardless of their creativity level, pupils' peer-conforming behavior is not related to the sociometric composition of the group.
4. There is no (statistical) interaction between the two variables, the nature of the task and the group composition, in relationship to pupils' peer-conforming behavior in a small-group situation.

Related Research

Studies by Barron (1957; 1958), Getzels and Jackson (1962), Roe (1959), and Torrance (1962a) seem to suggest that highly creative individuals tend to be independent of the group norms and standards. Thus, in Barron's studies (1957; 1958), highly original Air Force officers were characterized as self-assertive and personally dominant, while low originality officers were described as conforming, rigid and stereotyped. In the Getzels-Jackson study (1962), it was found that highly creative high school students were far less influenced than are highly intelligent students by social expectations in their choice of "desirable" personal qualities and future occupations. Torrance points out that one of the differentiating characteristics of high creative children is that their ideas are "off the beaten track, outside of the mold" (1962a, p. 78). Barron (1957; 1958), Roe (1959), and Torrance (1962a) all cite evidences that highly creative individuals are relatively free of rigid sex-role identification.

Social sanctions applied to highly creative members of a small group were called to attention in two studies by Torrance (1959, 1961). He noted that the most creative member in each group was subjected to pressure from other members to limit his creative productivity through open aggression and hostility, criticism, rejection, ignoring, and other controlling techniques. The most creative member, on his part, tried to adapt to this group pressure through compliance, counter-aggression, indomitable persistence, silence, apathy, and other measures. Such social stress was focused rather strongly on highly creative individuals in the group but not on highly intelligent members. The status of the child who had a high intelligence quotient but a relatively low creativity score seemed far more secure in this regard than the status of the child who was highly creative but relatively low on intelligence.

The same author (Torrance, 1962a; Torrance, 1962b) further contended that there are discontinuities in the development of originality of thinking in the American culture because of the cultural stresses of the transition from one developmental stage to another. He suggests that such discontinuities do not exist in certain other cultures because of their different cultural emphases.

Few of these studies have been replicated and many interesting hypotheses derived from them have not been subjected to careful investigation. As a result, there is a tendency for over-generalization of the results which are tentative, and for indulgence in free-wheeling discussion of the implications without solid evidence.

The effects of group pressure upon individual judgment in a controlled situation have been studied by, among others, Asch (1953), Crutchfield (1955), Luchins and Luchins (1961), Milgram (1961), Tuddenham (1958a; 1958b; 1959; 1961a; 1961b), and Wilson (1960). Asch (1953), after the classical study by Sherif (1937), placed a subject in a relation of radical conflict with all other members in a visual perception task. The minority of one planted in the unanimous but incorrect majority revealed a marked movement toward the majority in spite of the extreme individual differences observed. Crutchfield (1955) improved the Asch method to obtain a larger degree of experimental control and confirmed the results reported by Asch. Tuddenham (1958a; 1958b; 1959; 1961a; 1961b) increased the number of choices available to a subject to approximate a continuous range of possible responses and reported results in general agreement with those of Asch and Crutchfield. Milgram applied the method to a study of conforming behavior among two nationalities, French and Norwegians. His results suggested that "social conformity is not exclusively a U.S. phenomenon" (1961, p. 51).

All these and other studies suggest that both external (situational) and internal (personal) factors are operating in determining an individual's behavior in the face of a unanimous majority. The situational factors seem to include such variables as the nature of the task, the degree and/or amount of difference in judgment between the individual and the group, and the composition of the group (Blake, Helson, & Mouton, 1957; Blake & Mouton, 1961; London & Lim, 1964; Luchins & Luchins, 1961; Reitan & Shaw, 1964; Tuddenham, Macbride, & Zahn, 1958; Walker & Heyns, 1962). The personal factors would include a subject's self-confidence, perceived relation with his reference group, sociometric status, intelligence, and certain stylistic characteristics of personality (Berkowitz & Lundi, 1957; Crutchfield, 1963; Hochbaum, 1954; McDavid & Sistrunk, 1964; Wilson, 1960).

Studies applying the "group-pressure experiment" technique to children are not many but they tend to suggest the same kind of variables as determinants of children's social conformity (Berenda, 1950; Campbell, 1964; Iscoe& Hodgden, 1960; Iscoe, Williams, & Harvey, 1963; Iscoe, Williams, & Harvey, 1964; Jakubczak & Walters, 1959; Walters, Marshall, & Shooter, 1960).

Application of the technique to investigation of the specific relationships between creative thinking abilities and social conformity has been reported in few papers (Crutchfield, 1963; Rutherford, 1960). These studies on research scientists, architects, and college students led to a general conclusion that "there is consistent evidence for a significant empirical relationship between conformity tendencies in the person and lack of manifest creativity" (Crutchfield, 1963, p. 135). It was further suggested that "excessive conformity and counterformity alike can impair creativity" (Crutchfield, 1963, p. 138). To the author's knowledge, however, no study has employed this group-pressure technique to explore such relationships among children,in spite of its established feasibility and of the obvious advantage of increased control on variables. The present study was unique at least in this regard.

CHAPTER II

PROCEDURES

General Procedures

All fifth-grade pupils in a large, suburban, public school district participated in the study. A suburban system was selected to obtain gross control over socio-economic status of families, other "community" effects, and varying "school" effects. The intermediate grade level was selected because of the absence of comparable studies covering this age range and also because of the availability of adequate pencil-and-paper tests of creative thinking. Peer approval becomes important for a child at this stage of development and, hence, one of the experimental variables (group composition) was relevant. The choice of the specific grade was also governed by the consideration that fourth-graders reveal a marked slump in their creative thinking (Torrance, 1962a; Yamamoto, 1962) and that sixth-graders might be subject to academic and other pressures because of the expected transition to the junior-high level. It was, therefore, deemed wise to avoid the use of these two grades so as not to introduce additional, unknown external factors in the study.

The pupils were administered a battery of tests of creative thinking, a test of intelligence, and a sociometric nomination form. On the basis of their scores on the creativity battery, two groups of target subjects were identified. These subjects belonged to, respectively, the top and the bottom tenths on creative thinking. Half of the target subjects served as controls, and the other half as experimental subjects.

Within each level of creative thinking, experimental target subjects were randomly assigned to six combinations of the two variables, task (visual perception and information) and group composition (friend, neutral, and non-friend). Small groups of five members each, including one experimental target subject and four middle creative pupils, were then confronted with a series of multiple-choice type tasks. The target subject faced a group-pressure situation through pre-arranged manipulations on the part of the experimenter. Responses of the control target subjects (in randomly formed groups of five) to the same tasks under no group pressure served as criteria and the shift in the target subjects' judgments toward the alleged group concensus was recorded and analyzed.

Instruments of Measurement

Measures of Creative Thinking

A battery of tests of creative thinking, developed at the Bureau of Educational Research, University of Minnesota, under the leadership of Torrance (1962a), was employed in the study. In November of 1963, the Ask-and-Guess Test and the Test of Imagination (Dog Improvement, Dog Uses, and Circles) were administered to all the subjects in a group situation by the principal investigator and his assistants. The test forms are included in this report as Appendix A. The results were then scored for fluency, adequacy, flexibility, originality, and elaboration, according to a scoring scheme proposed by Yamamoto (1964) and the sum of all these subscores, called total creativity, was used as a single index of creative thinking[2] to identify high, middle, and low creativity subjects in a manner described later. Intercorrelations among subtotals on fluency, adequacy, flexibility, originality, and elaboration, based upon responses from 76 pupils, the same ones used to obtain the interscorer reliability (see below), ranged from .81 to .95 with a median of .89 (Yamamoto, 1964, p. 92).

Interscorer Reliability. To establish the degree of interscorer agreement, the same battery was administered in October of 1963 to 24 fourth-grade, 25 fifth-grade, and 27 sixth-grade children (total enrollment) in Kent State University School and the 76 protocols were scored by the four judges who later processed the data from the major study. Their interscorer reliabilities, presented in Table 1, were deemed sufficiently high for the purpose of the project.

Test-Retest Reliability. The creativity battery was administered to Kent State University School children again in December of 1963 and test-retest reliabilities were calculated for the eight-week interval from the results available for 70 pupils (21 fourth-, 24 fifth-, and

---

[2] This decision was governed by practical considerations with full knowledge, however, of the fact that there could be no "typically creative" person. It has been recognized that creative thinking is found in the conflux of multiple aptitudes, interests, motivations, personality inclinations, developmental history, environmental factors and chance variations (luck, accidents, and the like) and, accordingly, no single index can adequately serve as its fair and accurate representation.

Table 1

Interscorer Reliabilities among Four Judges
Scoring 76 Creativity Test Protocols

Scorer	A	B	C	D
A	---	.98**	.98**	.98**
B		---	.99**	.98**
C			---	.97**
D				---

**p $<$.01

and 25 sixth-graders). The correlations were all significant and ranged from .28 to .78 for various subscores. For the total creativity score, the coefficient was .79 which was significant at the .01 level. The data are shown in Table 2.

Validity. Validity of the creativity tests was examined in two ways, both employing teacher nominations as the criteria.

At Kent State University School, the three teachers of, respectively, the fourth-, fifth-, and sixth-graders were requested, during the eight-week interval between October and December 1963, to rank their pupils in terms of their general creativity level. The specific instructions read:

> In the spaces below, rank your pupils according to their creative thinking abilities from top (No. 1) down. A highly creative child is generally characterized as having many, original, and relevant ideas, by flexibility in thinking, and by thinking of all the details and consequences. It might be easier if you rank both ends (high and low creatives) and compare others with them. There is no need to differentiate boys and girls.

Rank-order correlations between the teacher ranking and the total creativity score ranks were .58, .19, and .59 for, respectively, the fourth-grade (N = 24), fifth-grade (N = 25), and sixth-grade (N = 27). The correlations for the fourth- and sixth-grades were significant at the .01 level.

Another validity check was made on a more extensive basis, enrolling 30 teachers of the subjects of the major study. In January 1964, after allowing these teachers sufficient time to get familiarized with their pupils of the academic year, a form titled "Who Does It?" was sent to each teacher to obtain teacher nominations. This form, attached as

Table 2

Test-Retest Reliabilities for Various Subscores of Creative Thinking Derived from Test of Imagination and Ask-and-Guess Test Administered Twice to 70 Fourth-, Fifth-, and Sixth-Graders with an Interval of Eight Weeks

Test	Part (Task)	Score Derived	Test-Retest r
Ask-and-Guess Test	I (Ask)	Fluency	.78**
		Adequacy	.77**
		Flexibility	.72**
		Subtotal	.75**
	II (Guess Causes)	Fluency	.59**
		Adequacy	.68**
		Flexibility	.34**
		Subtotal	.62**
	III (Guess Consequences)	Fluency	.60**
		Adequacy	.46**
		Flexibility	.43**
		Subtotal	.53**
	Total (I, II, III)	Fluency	.74**
		Adequacy	.76**
		Flexibility	.66**
		Total	.52**
Test of Imagination	IV (Toy Dog: Improvement)	Fluency	.70**
		Flexibility	.47**
		Originality	.60**
		Elaboration	.71**
		Subtotal	.66**
	V (Toy Dog: Unusual Uses)	Fluency	.42**
		Flexibility	.28*
		Originality	.46**
		Elaboration	.53**
		Subtotal	.49**
	VI (Circles)	Fluency	.63**
		Flexibility	.68**
		Originality	.58**
		Elaboration	.51**
		Subtotal	.61**

(Table 2 continued)

Test	Part (Task)	Score Derived	Test-Retest r
Test of Imagination	Total (IV, V, VI)	Fluency	.57**
		Flexibility	.62**
		Originality	.64**
		Elaboration	.67**
		Total	.66**
Both Tests	Total (I, II, III, IV, V, VI)	Total Creativity	.79**

$^{*}p < .05$
$^{**}p < .01$

Appendix B, allowed a teacher to nominate, from among her pupils, three who are high on fluency (most ideas), adequacy (most relevant ideas), flexibility (most flexible in thinking), originality (most original or unusual ideas), elaboration (best at thinking of all the details and all the consequences), and popularity (most popular), and also three who are low on these same criteria. On the basis of the teacher nominations, the 825 pupils[3] were divided on each criterion, except the last which was used for another purpose later, into three groups; Nominated-as-High, Non-Nominated, and Nominated-as-Low, and their scores on each corresponding dimension of the tests of creative thinking (subtotal on fluency, subtotal on flexibility, and the like) were compared by one-way analysis of variance. The results, presented in Table 3, indicated that, for every type of score, the group means were significantly different among themselves and in the expected direction and order. Further comparisons showed that the separation among the three group means was larger between Nominated-as-High and Non-Nominated groups than between Non-Nominated and Nominated-as-Low groups. For the total creativity score, however, both differences were significant at the .05 level.

Measures of Friendship Status

In November of 1963, pupils in each of the 31 classes were administered a two-criterion peer nomination form to select, from among their classmates, their best friends and non-friends (those with whom a pupil

---

[3] A total of 827 pupils were tested in November of 1963 as described later. In the interval between testing and teacher nomination (January 1964), however, two pupils moved away and reduced the number of subjects available for this analysis to 825.

Table 3

Validation of Tests of Creative Thinking against Teacher Nominations by Comparison among Nominated-as-High, Non-Nominated, and Nominated-as-Low Groups in 825 Fifth-Grade Subjects

Score	Nominated-as-High		Non-Nominated		Nominated-as-Low		MS_{among}[1]	MSE	F
	N	Mean	N	Mean	N	Mean			
Fluency	88	55.53	651	48.17	86	43.35	3353.323	332.684	10.08***
Adequacy	88	21.61	657	17.89	80	16.51	658.036	60.502	10.88***
Flexibility	86	32.01	654	27.10	85	25.00	1555.347	118.675	13.11***
Originality	84	60.64	656	54.76	85	48.85	2939.400	307.244	9.57***
Elaboration	84	39.42	661	33.96	80	30.26	1788.808	118.468	15.10***
Total Creativity	118	208.50	596	182.38	111	163.34	59798.854	2745.285	21.78***

***$p < .001$

[1] Comparisons among means by Scheffé's test:

	High vs. Non	Non vs. Low
Fluency	$p < .05$	$p < .10$
Adequacy	$p < .05$	ns
Flexibility	$p < .05$	ns
Originality	$p < .05$	$p < .05$
Elaboration	$p < .05$	$p < .10$
Total Creativity	$p < .05$	$p < .05$

does not want to associate). This form, "Who Are They?," consisted of two copies of the class list with two different instructions for each of the two criteria (cf. Appendix C).

The instructions for nomination of friends read:

> On the next page you will find a list of the names of the boys and girls in your class. You are to pick ten (10) classmates with whom you would like to play. Pretend that you are captain of a team and you are choosing up sides to play a game. Who would you choose first? Find his name on the list and put a (1) in front of it. Now, who would you choose next? Number his name (2). Keep going until you have chosen the ten people with whom you would like to play. When you have finished, you should have ten (10) names numbered.

The instructions for nomination of non-friends, on the other hand, read as follows:

> On the next page you will find another list of the names of the boys and girls in your class. This time you are to choose ten (10) classmates that you would not like to play with. If you were the captain of a team and were choosing up sides, which boy or girl would you choose last? Find his name and put a (1) in front of it. Who would be the next-to-the-last classmate you would choose? Number his name (2). Keep going until you have picked ten classmates with whom you would not like to play. When you have finished, you should have ten (10) names numbered.

In each case, pupils were reminded that the ten names could be either all boys, all girls, or both boys and girls. They were further assured of confidentiality of the results of nominations and told that "no one but the research workers from the University" would have access to these names. Those pupils who were nominated as neither friends nor non-friends were identified as "neutrals" in relation to the nominator.

For each subject, therefore, his classmates could be divided into three groups, Friends, Neutrals, and Non-friends. This procedure allowed the sociometric classification necessary for composition of small experimental groups to be described later.

Validity. Since teacher nominations of three "most popular" and "least popular" pupils in each class were available on the "Who Does It?" form (Appendix B), validity of pupil nominations was checked against these. On the basis of the teacher nominations, pupils were divided into Nominated-as-Popular, Nominated-as-Unpopular, and Non-Nominated groups. These three groups were then compared among themselves on the Friend and Non-Friend nominations received from pupils. The results of these analyses are presented in Table 4.

It is obvious from Table 4 that the pupil nominations did indeed agree well with teacher nominations. On the Friend criterion, the Nominated-as-Popular group obtained the highest mean pupil nomination score, followed by that of the Non-Nominated group and then by the Nominated-as-Unpopular group. On the Non-Friend criterion, the positions were reversed among these three groups again according to the expectation.

Reliability. No direct check on the stability of the peer nominations was made in the course of this project. However, previous studies by such writers as Bonney (1943), Cannon (1958), Gronlund (1959), Hunt and Solomon (1942), Singer (1951), and Wertheimer (1957), would seem to attest to the general stability of this kind of measures which is said to be as high as that for intelligence and achievement.

Table 4

Validation of Peer Nominations against Teacher Nominations by Comparison among Nominated-as-Popular, Non-Nominated, and Nominated-as-Unpopular Groups in 730 Fifth-Grade Subjects[1]

Peer Nominations Received on	Nom.-as-Popular[2]		Non-Nominated[2]		Nom.-as-Unpop.[2]		MS_{among}[3]	MSE	F
	N	Mean	N	Mean	N	Mean			
Friend	83	13.89	572	9.03	75	4.99	1587.328	16.415	96.70***
Non-Friend	83	4.42	572	8.76	75	14.11	1852.084	18.802	98.50***

***$p < .001$

[1] For the purpose of this analysis, all pupils who did not give exactly 10 nominations each on both Friend and Non-Friend criteria were excluded, thus reducing the number of available subjects to 730.

[2] These groups are based upon teacher nominations. The body of the table carries the mean number of nominations received from pupils.

[3] Comparisons among means by Scheefé's test:

	Nom.-as-Pop. vs. Non-Nom.	Non-Nom. vs. Nom.-as-Unpop.
Friend	$p < .05$	$p < .05$
Non-Friend	$p < .05$	$p < .05$

Measures of Intelligence

The Lorge-Thorndike Intelligence Tests, Level 3, Form A, Verbal Battery, were administered to all subjects in November of 1963 as a supplementary measure. This was done so as to make it possible to statistically control, if necessary, differences in intelligence between the high creative and low creative target subject groups identified in a manner described later.

Subjects

Classification of Subjects

A total of 827 fifth-grade pupils (394 boys and 433 girls) participated in the study. They were in 31 classes from 10 schools of a public system in a suburb (1960 Census population, 47,922) of a middle-sized industrial city (population, 290,351) in northeastern Ohio. The 827 subjects (all Caucasian) constituted 94.73 per cent of the total enrollment for the grade reported as of October, 1963, while complete data were not available for the remaining 46 pupils.

On the basis of their performance on the tests of creative thinking, pupils were classified into three groups, namely, A (high creative; top 10 per cent on creativity), Z (low creative; bottom 10 per cent on creativity), and M (middle creative; middle 80 per cent on creativity). A tie score made the size of groups A and Z slightly different, and 84, 661, and 82 pupils were found in, respectively, groups A, M, and Z.

When these three groups were compared on total creativity and intelligence, the results shown in Table 5 were obtained. It is seen that

Table 5

Means and Standard Deviations of Creativity and Intelligence Scores and Their Correlations for High, Middle, and Low Creative Groups among 827 Fifth-Graders

Group	N		Score		$r_{\text{creat.-IQ}}$
			Creativity	Intelligence	
A: High Creative	84	Mean	289.17	115.37	.21#
		Sd	33.65	13.06	
M: Middle Creative	661	Mean	180.19	110.59	.16**
		Sd	44.83	13.96	
Z: Low Creative	82	Mean	101.94	101.72	.19
		Sd	20.14	13.34	
Total	827	Mean	183.50	110.20	.22**
		Sd	65.70	17.10	
MS_{among} (df = 2)			745308.20	4122.32	
MSE (df = 824)			1045.75	183.39	
F^1			712.70***	22.48***	

***$p < .001$
**$p < .01$
#$p < .10$

[1] On both creativity and intelligence scores, High Creative group means were significantly ($\alpha = .05$) higher than Middle Creative group means and the latter, in turn, than Low Creative group means.

groups A, M, and Z were well separated among themselves in terms of their mean scores on creativity. The correlations between creativity and intelligence were low. Nevertheless, the three groups were significantly different also on intelligence. Such differences in intelligence were, however, not closely related to subjects' performance on experimental tasks as a later analysis shows (cf., Table 11).

Family Background

On the creativity test form, some information on family was collected from each pupil.

Number of Siblings. The reported number of brothers and sisters is presented in Table 6. For the total group, and for each of the three creativity groups, the average number of brothers and sisters was one each. It appeared, however, that the range for group A pupils was much smaller than those for M and Z groups with regard both to brothers and sisters.

Father's Occupation. Occupations of fathers, as reported by children, were classified into 12 categories after the Census system (U. S. Department of Labor, 1963). For the total group, about one half of the 827 fathers engaged in some kind of skilled labor occupations and about one sixth each were found in professional and clerical-sales type jobs (Table 7). When the three groups, A, M, and Z, were compared among themselves, no significant differences were detected, even though it was observed that the proportion of professionals was highest in group A and that of skilled workers increased steadily from A to M to Z. On the other hand, the proportions of clerical-sales workers and service workers decreased from A to M to Z.

Table 6

Number of Brothers and Sisters Reported by Subjects

Subjects		Brothers			Sisters		
Group	N	N	Mean	Range	N	Mean	Range
A: High Creative	84	89	1.06	0 - 3	102	1.21	0 - 4
M: Middle Creative	661	804	1.22	0 -10	767	1.16	0 - 9
Z: Low Creative	82	112	1.37	0 - 7	116	1.41	0 - 7
Total	827	1005	1.22	0 -10	985	1.19	0 - 9

Table 7

Parental Occupations and Vocational Aspiration for Self as Reported by Subjects

Occupation of	Subject Group	N	Percentage in Occupational Category[1] P	M	CS	SW	SS	S	US	F	H	DK	NR	D
Father[2]	A	84	20.2	4.8	19.1	44.0	0.0	7.2	0.0	0.0	0.0	0.0	2.4	2.4
	M	661	14.4	5.8	13.2	56.4	0.9	6.4	0.2	0.0	0.0	0.0	1.8	1.1
	Z	82	14.6	6.2	8.5	59.8	1.2	3.7	0.0	0.0	0.0	0.0	6.1	0.0
	Total	827	15.0	5.7	13.3	55.5	0.9	6.2	0.1	0.0	0.0	0.0	2.3	1.1
Mother[3]	A	84	9.5	0.0	6.0	7.1	0.0	4.8	0.0	0.0	72.6	0.0	0.0	0.0
	M	661	4.5	0.0	10.3	3.9	0.2	3.5	0.0	0.0	77.0	0.0	0.3	0.3
	Z	82	6.1	0.0	6.1	3.7	1.2	8.6	0.0	0.0	73.2	0.0	1.2	0.0
	Total	827	5.2	0.0	9.4	4.2	0.2	4.1	0.0	0.0	76.2	0.0	0.4	0.2
Child[4]	A	84	76.2	0.0	3.6	9.5	0.0	8.3	0.0	0.0	0.0	2.4	0.0	0.0
	M	661	61.6	0.2	5.3	13.3	0.5	6.5	0.0	0.8	3.6	8.2	0.2	0.0
	Z	82	49.3	0.0	2.5	14.7	0.0	11.0	0.0	1.2	2.5	18.6	0.0	0.0
	Total	827	61.8	0.1	4.8	13.1	0.4	7.1	0.0	0.7	3.1	8.6	0.2	0.0

[1] Classification was made according to the Census system (U. S. Department of Labor, 1963) as follows:

P - Professional
M - Managerial
CS - Clerical & Sales
SW - Skilled Worker
SS - Semi-skilled Worker
S - Service
US - Unskilled Worker
F - Farmer
H - Housewife
DK - Don't Know
NR - No Response
D - Deceased

[2] Comparison among A, M, and Z: chi-square = 10.586, df = 14, ns (categories SS and US combined by necessity).

[3] Comparison among A, M, and Z: chi-square = 16.375, df = 10, $p < .10$ (SS, NR, and D combined by necessity).

[4] Aspiration for future vocation. Comparison among A, M, and Z: chi-square = 27.787, df = 12, $p < .01$ (M, SS, F, and NR combined).

Mother's Occupation. Slightly more than three quarters of the mothers were reported to be full-time housewives, while about one tenth were found in clerical-sales jobs. Comparison among groups A, M, and Z (Table 7) in terms of all categories resulted in an almost significant ($p < .10$) chi-square value. In every group, the largest number was in the housewife category but the proportion was highest in group M (77 per cent). In both groups A and Z, it was about 73 per cent.

A similar curvilinear relation was observed in the clerical-sales occupation into which one in ten M mothers and one in twenty A and Z mothers were classified. Except in the housewife category, the highest proportion of groups A mothers (9.5 per cent) was found in the professional jobs, while that of group Z was in service jobs (8.5 per cent). In group M, the second highest proportion was in the clerical-sales category (10.3 per cent) as observed above.

Children's Vocational Aspiration. Children further indicated their own vocational aspiration by recording the kind of work they are interested in doing when they grow up. The results (Table 7) revealed that six out of ten children professed an interest in professional occupations, while about 13 per cent said they were interested in skilled labor jobs. It is interesting to observe that the picture was essentially the mirror image of the parental occupational distribution. As reported by children themselves, about 56 per cent of fathers were in skilled labor occupations, while only about 15 per cent were classified as professionals. The observation that most children named professional occupations as their preference when actually only about 12 per cent of the nation's working population in 1960 were supported in these jobs by the social structure (Miller & Form, 1964, p. 62) agrees well with the general findings of past studies of vocational aspiration of children and adolescents (Roe, 1956, p. 254).

In passing, it should also be observed that only six per cent of 433 girls (or three per cent of the total subjects) indicated "housewife" or "homemaker" as their primary future aspiration.

Differences among groups A, M, and Z were found to be significant. The proportion of children aspiring to do some professional-type work decreased steadily from A (76 per cent) to M (62 per cent) to Z (49 per cent), while those indicating interests in skilled labor occupations revealed an opposite relation (A, 10 per cent; M, 13 per cent; Z, 15 per cent). Of special interest is the proportion of children answering "I do not know" (DK responses) which showed a sharp increase from A (2 per cent) to M (8 per cent) to Z (19 per cent). Seemingly, then, the low creative children were both less committed to any occupational choice and less oriented toward "high-level" professional jobs than middle creative children and the latter, in turn, less than high creative children.

The result reminds one of a similar trend revealed in a study by Hollinshead (1949) between social class and vocational aims among Elmtown high school youth. There, it was reported that high occupational aspiration and low uncertainty in vocational aims were associated with adolescents from higher social classes, while lower social class students were characterized by much lower aspiration and higher indecisiveness.

In the present study, no parallel between low creativity and low social class could (or should) be directly inferred. Further, it is obviously premature to attribute a higher degree of vocational immaturity to low creative pupils on the basis of the larger proportion of the DK responses among them in contrast to that among more creative children. Quite pertinent here is the observation by such writers as Holland (1962), Holland and Nichols (1964), MacKinnon (1959), and Nichols (1964) that, among adults and high-aptitude college and high school students, the more creative individuals tend to be more indecisive about their educational and vocational plans and to have parents more permissive in their child-training attitudes which were in turn found to be associated with creative accomplishments of their children. "In the past, we have been perhaps too ready to equate indecision with illness, confusion and the need for counseling. For some people, the deferment of vocational choice may represent a slow and complex rate of personal development" (Holland & Nichols, 1964, p. 33). The real question is, then, how the highly creative children who seemed to have better crystalized vocational fantasies (or tentative choices) than those of their less creative classmates develop into a group of high school and college students who tend to defer their vocational choices and change their major fields of study more often than the less creative group. A need for developmental, longitudinal studies in obvious.

Regarding the low creative child in the present study, their lower occupational aspiration, which was more consonant with their fathers' actual occupations, might indeed have been an indication of somewhat more accelerated vocational development in the fantasy-tentative-realistic choice process suggested by Ginzberg, Ginsburg, Axelrad, & Herma (1951). It may be implying that "after a period of fantasy and one of tentative selection," the less creative child, "having sized up his interests and capacities and drawn on the wisdom of his family and friends, decides to find work which involves manual activity" (Spaulding, 1961, p. 118). If this is the case, the low creative children seem to be revealing a stronger reality orientation than their more creative agemates.

All the evidence presented in this section suggests the relationships between family environment and development of children's creative thinking abilities as a fruitful area of future inquiries. The sociology and social psychology of creative thinking would seem to be both necessary and challenging fields of systematic investigation.

Formation of Test Groups

The pupils in groups A and Z (henceforth called "target subjects") were randomly assigned to experimental and control groups. The experimental target subjects were further randomly assigned to one of six combinations of two variables, group composition and task.

The group composition variable consisted of three categories, Friend, Neutral, and Non-friend, and represented the degree of attractiveness of the source of the group pressure exerted upon a target subject. This categorization of group M members was based upon target subjects' responses on the peer nomination form. Those pupils who did not receive nominations from target subjects either as friends or as non-friends were classified as neutral.

An experimental target subject from group A or Z and four subjects from group M in the same class constituted an experimental "test group" which underwent the group-pressure experiment. It was originally intended that the four members from group M (Friend, Neutral, or Non-friend) be consisted of two boys and two girls so as to control the possible effects of sex composition. This scheme had to be abandoned, however, because of the extreme difficulty in so composing the test groups in face of the strong same-sex friendship patterns (boys choose boys as friends and girls as non-friends, and vice versa) at this particular developmental level. A later analysis (cf. Table 27) would, however, seem to indicate that this change in the study design did not affect the dependent variable to a large extent.

Originally, a total of 84 group A and 82 group Z subjects were identified and one half of each group was randomly assigned to the experimental target group and the rest to the control target group. The process of group composition reduced the usable number of experimental test groups of 76, including 76 target subjects and 304 group M subjects. In the course of actual experimentation, moreover, two experimental groups were irretrievably lost due to a target subject's transfer to another school system in one case and to an extended European trip in the other. When any non-target members of an experimental test group were unavailable, substitute subjects from group M in the suitable friendship category were employed in their place. If, on the other hand, any target subjects were absent because of sickness or some other temporary reasons, testing was re-scheduled for the particular test groups so as not to lose them.

The control target subjects, on the other hand, were also randomly assigned to small groups of five each (control test groups). No consideration was given to their creativity level and the assignment was made across classrooms in a school. Among control groups, no subjects from group M were present and, hence, the tri-partite friendship classification was irrelevant. A total of 17 control test groups were formed out of the 83 control target subjects but, at the completion of experiments, usable data were available for only 68 subjects. The attrition was mainly due to transfer, illness, and other practical exigencies (e.g., no "group" experiment could be carried out when only one target subject was left in a school after all others had been tested). Table 8 presents the number of test groups by group composition, task, and target subjects' creativity level, and Table 9 shows the exact number by task, sex, and creativity level of target subjects for whom complete sets of data were collected in the experiments.

To guard against a source of contamination effects, one of the project staff was exclusively in charge of the group formation process and she later served as a liaison person between classrooms and the testing room. Accordingly, throughout the experimental phase of the project, the actual creativity level of a target subject (group A or Z) and the nature of his four group mates (friends, neutral, or non-friends) were known only to this staff member. The rest of the project staff, handling other aspects of the experiment, were informed merely of the distinction between experimental and control groups and of that between the two types of tasks.

Table 8

Number of Test Groups[1] by Target Subject's Creativity Level, Group Composition, and Experimental Task

j / k / i		Experimental						Control	
		Group Composition							
		j=1: Friend		j=2: Neutral		j=3: Non-friend			
		Task		Task		Task		Task	
		k=1 Perception	k=2 Information	k=1 Perception	k=2 Information	k=1 Perception	k=2 Information	k=1 Perception	k=2 Information
Level of Creativity	i=1 A(high)	7	7	6	6	6	5	8	9
	i=2 Z(low)	5	5	5	7	7	8		

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[1] Number actually participating in the experiment. Originally, one more group was scheduled in the A-Neutral-Perception cell and another in the Z-Neutral-Perception cell. Both these were unrecoverable.

Table 9

Number of Target Subjects by Creativity Level, Sex, and Experimental Task

Sex	Task	Control		Experimental	
		A[1]	Z[1]	A	Z
Boy	Perception	4	14	5	12
	Information	9	11	7	12
Girl	Perception	9	4	14	5
	Information	10	7	11	8
Total	Perception	13	18	19	17
	Information	19	18	18	20

[1] "A" stands for high creative, and "Z" for low creative subjects.

Group-Pressure Experiment

Experimental Tasks

Tasks used in the experiment were of two kinds, perception and information. The first category was represented by tasks involving visual perception and the second category dealt with tasks concerning general information. These two categories were selected in exclusion of tasks asking for attitudinal judgments and personal preferences because (1) a larger degree of conformity was shown by subjects to perceptual and informational tasks than to attitudinal tasks and (2) the use of non-controversial judgmental materials is preferred from ethical viewpoint to those materials involving controversial or personal judgments (Crutchfield, 1955, Tuddenham, 1958a).

Preparation and Selection of Tasks. An item pool of perception and information tasks was constructed and administered in a printed form to a total of 75 fourth-, fifth-, and sixth-graders at Kent State University School. Each task was a multiple-choice type with seven provided choices. The original choice distribution for each task was then rearranged to yield a uni-modal, roughly symmetrical distribution, and new choice numbers were assigned so as to make the mode correspond to the choice position of four and also to prevent any position effects in subjects' responses by scrambling the original position numbers. A cumulative percentage curve was drawn next and a task was retained only when the distribution possessed an interquartile range between .9 and 2.1.

Ten experimental tasks and two practice tasks each were selected for perception and information and a total of 48 black and white slides were made of them, two slides for each task. The first slide included a question (or stimulus figure) and the second slide gave seven possible answers (or choices) to the question.

Perception Tasks and Instructions. Three categories of tasks involving visual discrimination and perception were subsumed under "Perception" in this study. The first category was called "Recognition" and required a subject to identify a geometric form which is exactly the same as the one given as the stimulus figure in the first slide. Three experimental tasks (Nos. 1, 2, and 7) and one practice task belonged in this category.

The second category was called "Puzzle A" and this involved selection of one set of geometric pieces out of seven which fits together to make up the stimulus figure shown first. Four experimental tasks (Nos. 3, 4, 6, and 8) were in this group.

The third category was "Puzzle B" and here a subject was required to choose one set of geometric pieces out of seven which and only which does not fit together to make up the stimulus figure. Three experimental (Nos. 5, 9, and 10) and one practice tasks were in this group.

In the actual experiment, no identification of task types was made by the labels (Recognition, Puzzle A, and Puzzle B) and the order of presentation of the ten experimental tasks was randomized. Subjects were directed in each task by specific instructions given orally by an experimenter while the first (question or stimulus) slide was exposed on a screen for an interval of 20 seconds.

All the "Perception" tasks, in the exact order of presentation and with their respective instructions, are included in Appendix D.

Information Tasks and Instructions. Tasks used under "Information" uniformly asked a question to which one correct (but not obvious) answer was planted among seven possible choices. The questions covered topics in social studies and general science, and instructions were repeated on each task while the first (question) slide was exposed on a screen for an interval of 10 seconds. The order of presentation of tasks was random.

All the "Information" tasks, in the exact order of presentation and with the precise instructions, are given in Appendix F.

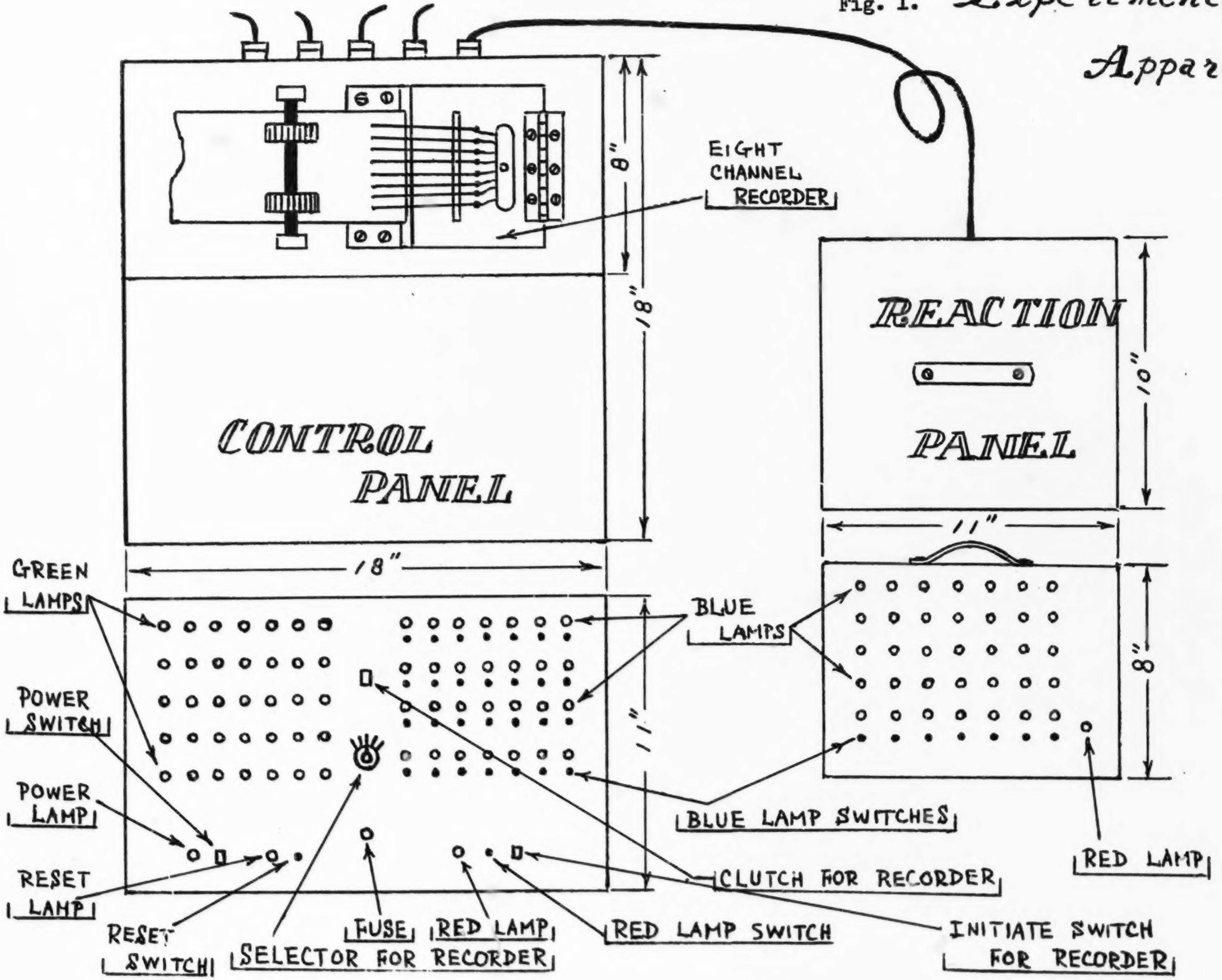
Experimental Procedures and Apparatus

Group-pressure experiments were conducted in each of the participating schools by setting up a "test room." Each test group (one experimental target subject from Group A or Z and four subjects from group M who represent one of the three group-composition categories, Friend, Neutral, and Non-Friend) was led by an experimenter into the room where the experimental apparatus was situated.

The apparatus used in the experiments consisted of six portable panel boxes, one for an experimenter (the control panel) and five for pupils (the reaction panels). These panels are sketched in Figure 1.

Five pupils sat next to each other in front of their respective reaction panels with the target subject in the center. The panel boxes were arranged in a semicircle so as to obstruct the field of vision from each other and no direct communication among the subjects was allowed.

Fig. 1. Experimental Apparatus


EIGHT CHANNEL RECORDER
8"
18"
CONTROL PANEL
18"
REACTION PANEL
10"
11"
8"
11"
GREEN LAMPS
POWER SWITCH
POWER LAMP
RESET LAMP
RESET SWITCH
SELECTOR FOR RECORDER
FUSE
RED LAMP
RED LAMP SWITCH
BLUE LAMPS
BLUE LAMP SWITCHES
CLUTCH FOR RECORDER
INITIATE SWITCH FOR RECORDER
RED LAMP

An experimenter sat in front of the control panel placed behind the subjects.

The tasks were then presented to the group as a series of slides projected on a screen. An experimenter indicated a specified order of responses among subjects by lighting a red lamp on each reaction panel through his control-panel switch. Pupils reported their judgments by pushing one of seven switches on their respective reaction panels and their choices were shown on the control panel by small green lamps. The order of responses was randomly varied from one task to another but, unknown to the subjects, it was identical for all reaction panels. At a given moment, therefore, all five members believed themselves to be the first respondent, or at another time, the fourth, and so on.

Supposedly, each member's choice was directly conveyed to others by a blue lamp on each of the reaction panels which, in fact, could only be lighted by the experimenter through his control panel. The actual responses of the four members did not affect the panel of the target subject where certain pre-selected responses were registered by the experimenter as group judgments. In this fashion, a controlled picture of group opinion was presented to the target subjects and their choices and the reaction time under this group-pressure condition were recorded.

Presented Choice Patterns. The faked norm choice, conveyed through the control panel to each of the reaction panels, was determined by randomly assigning a choice position to tasks, corresponding either to the tenth or ninetieth centile point in the respective cumulative percentage distributions. The target subject's turn in a presumed five-man response sequence on each task was again randomized so as to prevent his suspecting the actual nature of the experiment. Further, the degree of faked consensus among the four "respondents" preceding or following the target subject was randomly varied between four of the same choice and a three-one split. As mentioned before, the order of presentation was randomly determined among ten experimental tasks and, then, this random order was uniformly applied to all test groups throughout the study. The resultant choice patterns for both perception and information tasks are summarily presented in Table 10.

Experimenters. In the experiments one male and four females constituted the experimenter team. Throughout the group experimental sessions, one and the same "liaison" experimenter (female) handled subjects, calling each test group out, leading the five children into the test room, seating them, and taking them back to their room. She told the rest of the experimenter team only whether the particular test group was to be given either the perception or information tasks and whether it was an experimental group or a control group. Thus, other experimenters were kept unaware of the level of creative thinking of the target subject (group A or Z) and of the sociometric constitution of the group (Friend, Neutral, or Non-Friend). Contamination from these sources was controlled in this manner.

One female experimenter each was assigned to the control panel, slide projector, and manual recording task, and a male experimenter oversaw the entire operation to trouble-shoot if necessary. The "panel" experimenter manipulated all operations on the control panel, feeding the faked choice patterns in, indicating choice positions, and so on. The "projector"

Table 10

Experimental Tasks, Faked Norms, Choice Positions, and Choice Patterns

Task			Correct	Faked Norm	Target S's	Choice Patterns[3]					Exposure Time	
Category	No.	Content	Choice	Choice[1]	Choice Turn[2]	I	II	III	IV	V	Stimulus	Response
Perception	Practice A	Tree	4	4	III	4	4	x	4	4	20 sec.	Till completion
	Practice B	Trapezoid	7	3	I	x	3	3	3	3		
	1	Elephant	4	5	V	6	5	5	5	x		
	2	Pie	4	2	III	2	2	x	2	2		
	3	Castle	5	1	IV	1	1	2	x	1		
	4	Cream Cone	4	5	II	5	x	5	5	5		
	5	Parallelogram	4	1	V	1	1	1	1	x		
	6	Lamp	4	5	V	5	6	5	5	x		
	7	Maze	4	2	IV	2	2	2	x	1		
	8	Sail	4	6	III	6	6	x	5	6		
	9	Circle	5	2	IV	2	2	2	x	2		
	10	Arrow	7	6	II	6	x	6	6	6		
Information	Practice A	River	3	3	III	3	3	x	3	3	10 sec.	Till completion
	Practice B	Mozart	5	4	I	x	4	4	4	4		
	1	City	3	2	II	2	x	1	2	2		
	2	Song	3	1	III	1	1	x	1	2		
	3	Kuwait	7	5	II	5	x	5	5	5		
	4	Storm	5	5	V	6	5	5	5	x		
	5	Deciliter	4	6	IV	6	6	6	x	6		
	6	Samoa	5	2	IV	2	2	2	x	2		
	7	Sun	5	2	III	2	2	x	1	2		
	8	Guastalla	5	2	IV	2	2	2	x	2		
	9	Bible	3	6	V	6	5	6	6	x		
	10	Krakatoa	4	6	V	6	6	6	6	x		

---

[1] Faked choice position among the seven possible choices provided. Modal choice in a pilot study was No. 4.

[2] Choice turn among the five members of a test group. E.g., No. II indicates the second position in the sequence.

[3] Faked patterns of test group members' choice positions. The sign, x, indicates the target subject's turn.

experimenter read the instructions and changed slides by remote control and at an exact exposure interval. Finally, the "recorder" experimenter recorded all response patterns on the reaction panels, which were monitored through the control panel, and also measured the reaction time for target subjects. The reaction time refers to that between lighting of a red signal lamp, which was the "go ahead" sign, and a target subject's choice making. Actually, both choice and reaction time of a target subject were automatically recorded on an eight-channel recorder built into the control panel and, therefore, the manual recording was made as a backup or safety measure and also for the purposes of calibrating the automatic recorder.

Control Groups

The control target subjects were assigned to test groups randomly in reference to their creativity level and class membership. Most test groups consisted of five members but, in some cases, subjects had to be tested in fours and threes.

A total of eight test groups, or 31 target subjects took the perception tasks under the control test condition, while a total of nine groups, or 37 target subjects, responded to the information tasks (cf. Tables 8 and 9). The same apparatus and the same procedures as those employed with the experimental test groups were used with the control target subjects. The only difference in treatment was that no faked norm information was fed back to the subjects and, hence, no group pressure was exerted to influence their judgments. The instructions, adjusted to the control cases, are included in Appendix E (perception tasks) and Appendix G (information tasks).

The control target subjects' choices were the major criterion measures in the study and the shifts toward the alleged group consensus (faked norm choices), shown by the experimental target subjects, against the criteria were analyzed.

CHAPTER III

FINDINGS

General Plan of Analyses

In this chapter, findings will be described in three parts, preliminary analysis, major analyses, and supplementary analyses. In the preliminary analysis, correlation coefficients between IQ and criterion measures were calculated to determine whether it was necessary to take the measures of intelligence into consideration in the subsequent analyses. In the major analysis section, five separate analyses were presented to describe the relationships among the three variables of the study, namely, the creativity level of subjects, sociometric group composition, and task type. Finally, in the supplementary analysis section, three additional analyses were presented to give some gross pictures about the possible effects (unfortunately confounded) of the degree of group pressure, sex composition of test groups, and subtypes of perception tasks.

In some of these analyses, the results obtained from the total 74 experimental target subjects were utilized while, in others, some of them were randomly excluded to obtain equal cell frequencies, thus reducing the number to 60. It should also be remembered that two kinds of criterion measures (choice and reaction time) and three forms of scores (raw, standard, and standard absolute deviation) were employed in the analyses. The exact number of target subjects and the precise nature of the scores were specified in each analysis.

Preliminary Analysis: Effects of Intelligence

Correlations between IQ and Criterion Raw Scores

As reported earlier (Table 5), the mean intelligence score of group A (high creative) was significantly higher than that of group M (middle creative) and the latter, in turn, than the group Z (low creative) mean. If, therefore, the level of intelligence happens to be closely associated with subjects' criterion performance under the testing conditions, some statistical control for this would be necessary to avoid confounding from this source. To examine this possibility, correlation coefficients were computed for experimental target subjects between their IQ and raw criterion scores (choice and reaction time) in the group-pressure experiment.

The results of this analysis are summarily shown in Table 11. It is seen from these data that the correlations between IQ and the criterion measures were quite low and only one was statistically significant. It was accordingly decided not to correct the criterion scores for the observed IQ differences between groups A and Z. The observation of no correlation agrees with results reported by Berenda (1950), Fisher, Williams, and Lubin (1957), Iscoe, Williams, and Harvey (1963), Iscoe, Williams, and Harvey (1964), Jenness (1932), and Wilson (1960), but disagrees with those given by Crutchfield (1955). Obviously, "Studies of the relationship between intelligence and susceptibility are not entirely clear; if a relationship does exist, it probably is inverse and curvilinear" (Blake & Mouton, 1961, p. 254). In the context of the present study, however, the intelligence variable was deemed irrelevant.

Table 11

Correlation Coefficients between IQ and Raw Choice and Time Scores

Task Type	N	Task No.	r IQ - Choice	r IQ - Time
Perception	36	1	-.05	-.04
		2	.06	-.04
		3	.07	-.18
		4	-.21	-.10
		5	-.10	.01
		6	.19	-.04
		7	.17	-.03
		8	-.07	-.06
		9	.28	-.12
		10	-.01	-.04
Information	38	1	.24	-.47**
		2	.02	-.14
		3	-.04	-.09
		4	-.10	.02
		5	-.06	.01
		6	.24	-.01
		7	.25	-.09
		8	.15	.00
		9	-.10	.17
		10	.01	.29#

**$p < .01$
#$p < .01$

Major Analyses: Creativity Level, Group Composition, and Task

Agreement with Faked Norms

One measure of conforming behavior is the proportion of the subjects who agreed with the faked "group consensus" presented by the experimenter. All responses were dichotomized into "agree" and "disagree" categories, regardless of the extent of disagreement revealed by non-conforming subjects.

The results of this analysis are presented in Table 12. Since there were no norms for reaction time, the analysis concerned only the raw choice criterion scores obtained from all 74 experimental target subjects. In terms of the proportion agreeing with faked norms, there was no consistent trend observable over ten tasks or between group A (high creative) subjects and those in group Z (low creative). None of the differences was significant on information tasks, while only one difference (task No. 6) reached statistical significance on perception tasks. One-sixth to four-sixths of the target subjects selected the same response as that represented as "other members' choices."

In reference to the particular criterion, then, it must be concluded that high creative and low creative subjects did not show any differential behavior in the group-pressure experiment.

Creativity Level, Group Composition, and Task Category: Overall Analyses in Terms of Standard Scores

A more sensitive measure of social conformity seemed to be the one which takes the extent (degree) of the effects of group influence into account. The responses given by control target subjects who experienced

Table 12

Percentages of Experimental Target Subjects Choosing Responses Same as Faked Norm Choice Positions

Task No.	Perception Task			Information Task		
	A (N=19)	Z (N=17)	Difference	A (N=18)	Z (N=20)	Difference
1	42.1	47.1	ns	16.7	30.0	ns
2	26.3	29.4	ns	44.4	55.0	ns
3	31.6	17.7	ns	55.6	65.0	ns
4	36.8	41.2	ns	50.0	45.0	ns
5	52.6	41.2	ns	44.4	60.0	ns
6	63.2	29.4	$p < .05$	61.1	55.0	ns
7	21.1	17.7	ns	27.8	45.0	ns
8	52.6	41.2	ns	50.0	50.0	ns
9	36.8	35.3	ns	38.9	55.0	ns
10	57.9	64.7	ns	72.2	65.0	ns
Total	42.1	36.5	ns	46.1	52.5	ns

no group pressure in the course of the experiment served as the anchor points from which deviations assumed to reflect such effects were measured.

Derivation of Standard Scores. For choice scores, no transformation was indicated by the raw distributions and, accordingly, the experimental target subjects' raw choices were linearly converted into a system of standard scores with a mean of ten and a standard deviation of two, on the basis of the control target subjects' responses which are tabulated in Table 13.

Reaction time scores, on the other hand, showed markedly skewed distributions and, hence, a logarithmic transformation, log (X + 10), was made to the raw scores of both control and experimental target subjects. Then, on the basis of the transformed reaction time of control subjects shown in Table 14, experimental subjects' scores were linearly converted to a system of standard scores with a mean of ten and a standard deviation of two.

Choice Standard Scores: An Overall Analysis. Table 15 presents each experimental target subject's mean choice standard scores over ten tasks by creativity level, group composition, and task category. For the purposes of this and subsequent major analyses, 14 of the 74 subjects were randomly excluded to obtain equal cell frequencies. In terms of choice standard scores, none of the means or of the variances of the original (unequal) cells was significantly different from that of the equalized cells, thus confirming the random nature of the exclusion process.

The results of a three-way, fixed-effects analysis of variance, treating the creativity level as an organismic variable (Edwards, 1960,

Table 13

Percentage Distributions, Means, and Standard Deviations
of Raw Choice Scores by Control Target Subjects

Task Category	Choice Position	Task No. 1	2	3	4	5	6	7	8	9	10
Perception[#]	1	3.2	6.5	3.2	9.7	9.7	12.9	6.5	6.5	3.2	19.4
	2	9.7	9.7	12.9	0.0	12.9	16.1	6.5	12.9	6.5	32.3
	3	29.0	16.1	29.0	6.5	6.5	6.5	9.7	9.7	22.6	6.5
	4	38.7*	48.4*	9.7	51.6*	41.9*	35.5*	41.9*	19.4*	29.0	16.1
	5	9.7	16.1	35.5	0.0	3.2	22.6	29.0	19.4	29.0*	12.9
	6	3.2	3.2	9.7	32.3	19.4	3.2	3.2	3.2	9.7	9.7
	7	6.5	0.0	0.0	0.0	6.5	3.2	3.2	29.0	0.0	3.2*
	Mean Choice	3.774	3.677	3.903	4.290	4.000	3.613	4.032	4.581	4.032	3.129
	Sd	1.313	1.147	1.353	1.463	1.685	1.538	1.282	1.947	1.204	1.764
Information[†]	1	0.0	2.7	16.2	10.8	8.1	10.8	13.5	13.5	5.4	5.4
	2	2.7	5.4	16.2	0.0	8.1	5.4	2.7	10.8	2.7	13.5
	3	24.3*	18.9*	16.2	10.8	40.5	10.8	10.8	16.2	21.6*	40.5
	4	54.1	51.4	16.2	27.0	32.4*	21.6	54.1	10.8	37.8	21.6*
	5	0.0	8.1	10.8	32.4*	2.7	43.2*	8.1*	8.1*	10.8	10.8
	6	13.5	2.7	21.6	13.5	5.4	5.4	8.1	21.6	18.9	8.1
	7	5.4	10.8	2.7*	5.4	2.7	2.7	2.7	18.9	2.7	0.0
	Mean Choice	4.135	4.081	3.649	4.324	3.405	4.081	3.757	4.297	4.135	3.432
	Sd	1.166	1.343	1.834	1.526	1.262	1.478	1.422	2.091	1.379	1.242

[#] N = 31

[†] N = 37

*Denotes the correct choice.

Table 14

Means and Standard Deviations of Raw and Transformed Reaction Time by Control Target Subjects

Task		Raw Score[1]		Transformed Score[2]	
Category	No.	Mean	Sd	Mean	Sd
Perception	1	10.050	12.664	1.238	.678
	2	11.488	10.417	1.280	.670
	3	9.413	6.648	1.260	.501
	4	17.438	19.088	1.368	.720
	5	6.475	5.078	1.199	.381
	6	19.013	12.765	1.411	.709
	7	13.888	14.999	1.293	.849
	8	12.588	10.722	1.312	.586
	9	7.963	7.215	1.221	.535
	10	16.000	10.209	1.375	.614
Information	1	6.078	8.264	1.169	.511
	2	10.256	16.211	1.228	.715
	3	15.256	22.839	1.303	.805
	4	14.289	23.518	1.264	.898
	5	16.056	18.680	1.329	.825
	6	14.378	17.463	1.296	.846
	7	11.400	12.830	1.273	.655
	8	14.578	16.159	1.308	.817
	9	13.989	20.206	1.285	.815
	10	12.233	15.434	1.271	.745

[1] In seconds. N was 8 for perception tasks and 9 for information tasks, due to the fact that only one member's reactions were automatically recordable for each test group on the channel recorder. Seating arrangements for control target subjects were random.

[2] Logarithm of (raw score + 10).

Table 15

Mean Choice Standard Scores of Experimental Target Subjects by Creativity, Level, Group Composition, and Task Category

Creativity Level	Friend		Neutral		Non-Friend	
	Perception	Information	Perception	Information	Perception	Information
High	8.707	10.181	11.264	10.305	9.539	10.040
	11.070	10.831	10.130	10.570*	9.922	9.940
	9.396	9.873	9.985	11.053	9.688	10.038
	9.872	9.906*	10.366*	9.899	10.500*	11.471
	9.756*	11.350	8.750	9.780	9.882	10.487
	11.233	9.330*	9.892	9.799	10.277	
	9.731*	10.232				
Low	10.207	9.884	9.717	10.434	9.100	9.551
	10.073	8.817	9.865	10.085*	9.594	11.184*
	9.180	9.968	9.524	9.758	10.241	10.261
	8.964	10.232	10.409	10.575	9.389*	9.970*
	10.668	9.624	10.885	8.579	10.444	9.833
				9.758*	10.113*	9.717
				10.131	11.451	10.697*
						10.419

*Observations randomly excluded for subsequent major analyses. The exclusion did not result in any significant differences in either the mean or variance between the original cells and the reduced cells.

pp. 215-216), are shown in Table 16. None of the main effects nor of the interaction effects was statistically significant and the null hypotheses could not be rejected.

Time Standard Scores: An Overall Analysis. Mean time standard scores over ten tasks in each task category are given in Table 17 for 74 experimental target subjects. The random exclusion of 14 subjects did not result in any cell means or variances significantly different from the original values. In Table 17, it is remarkable to observe that the mean reaction time for experimental subjects was almost uniformly shorter than that for control subjects which equals ten in the standard score format. In fact, only less than ten per cent of the total responses given by experimental subjects (26 of 360 for perception and 35 of 380 for information) were larger than the mean time score for controls. The presence of some kind of pressure in the experimental situation, even though nothing more than a "pace-setting" type, may be surmised from this.

The results of analysis are presented in Table 18. The only significant effect was that between task categories, where the mean for perception tasks was 9.424 and that for information was 9.592. Null hypotheses concerning creativity level and group composition again could not be rejected.

Creativity Level, Group Composition, and Individual Tasks: Repeated Measurement Analyses in Terms of Standard Scores

The overall analyses, presented in the foregoing section, might have been covering up some real differences because of the original pooling of scores over ten tasks in each task category. For this reason, additional

Table 16

Analysis of Variance of Mean Choice Standard Scores of Experimental Target Subjects[1]

Source	df	MS	F
Creativity Level (C)	1	.766	1.59
Group Composition (G)	2	.032	< 1
Task Category (T)	1	.164	< 1
(C) x (G)	2	.310	< 1
(G) x (T)	2	.050	< 1
(C) x (T)	1	1.124	2.33
(C) x (G) x (T)	2	.049	< 1
Error	48	.483	

[1] Homogeneity of variance tested by Hartley's F_{max} (Winer, 1962, p. 93). $F_{max} = 15.13$, non-significant for 12 and 4 df at the .05 level.

Table 17

Mean Time Standard Scores of Experimental Target Subjects by Creativity Level, Group Composition, and Task Category

Creativity Level	Friend		Neutral		Non-Friend	
	Perception	Information	Perception	Information	Perception	Information
High	9.256	9.519	9.495	9.439	9.385	9.621
	9.345	9.383	9.262	9.519*	9.656	9.591
	9.603	9.683	9.628	9.785	9.456	9.196
	9.203	9.737*	9.310*	9.504	9.402*	9.636
	9.359*	9.785	9.574	9.469	9.398	9.729
	9.050	9.552*	9.823	9.550	9.160	
	9.689*	9.468				
Low	9.191	9.679	9.360	9.532	10.028	9.676
	9.179	9.442	9.401	9.990*	9.187	9.665*
	9.276	9.644	9.220	9.560	9.263	9.308
	9.308	9.820	9.268	9.722	9.569*	9.596*
	9.606	9.709	9.435	9.632	9.186	9.710
				9.729*	9.315*	9.684
				9.746	10.508	9.592*
						9.526

*Observations randomly excluded from subsequent major analyses. The exclusion did not result in any significant differences in either the mean or variance between the original cells and the reduced cells.

Table 18

Analysis of Variance of Mean Time Standard Scores of Experimental Target Subjects[1]

Source	df	MS	F
Creativity Level (C)	1	.022	< 1
Group Composition (G)	2	.041	< 1
Task Category (T)	1	.423	7.66**
(C) x (G)	2	.046	< 1
(G) x (T)	2	.090	1.64
(C) x (T)	1	.014	< 1
(C) x (G) x (T)	2	.080	1.45
Error	48	.055	

[1] Variance homogeneity, $F_{max} = 44.59$, non-significant for 12 and 4 df at the .05 level.

$^{**}p < .01$

analyses were made, still using the same standard score format, but treating subjects' responses over ten tasks as repeated measurements (fixed model; Winer, 1962, p. 338).

Choice Standard Scores on Perception: A Repeated Measurement Analysis. The results of this three-way analysis (creativity level, group composition, and repeated measures on perception tasks) are presented in Table 19. The among-task variance was significant ($p < .001$) but this was of no major import in the context of the present investigation.

The interaction between creativity level and group composition, on the other hand, was almost significant ($p < .10$) and indicated a very interesting reversal between high creative subjects and low creative ones. The mean standard scores obtained by the high creative subjects were 10.056, 10.004, and 9.862 for, respectively, friend, neutral, and non-friend groups, while the corresponding values for the low creative subjects were 9.818, 10.080, and 10.160. In other words, the highly creative subjects deviated most when they were with their non-friend classmates, while the low creative subjects deviated most when they were with their friends. In both groups of subjects, further, the deviation (from 10.000) was smallest when they were undergoing the experiment with their neutral peers. Such response patterns are highly suggestive of different underlying dynamics, operating in the reactions of high versus low creative pupils.

Choice Standard Scores on Information: A Repeated Measurement Analysis. Table 20 shows the results of the analysis for information tasks. In this case, there was a significant difference between high and low creative target

Table 19

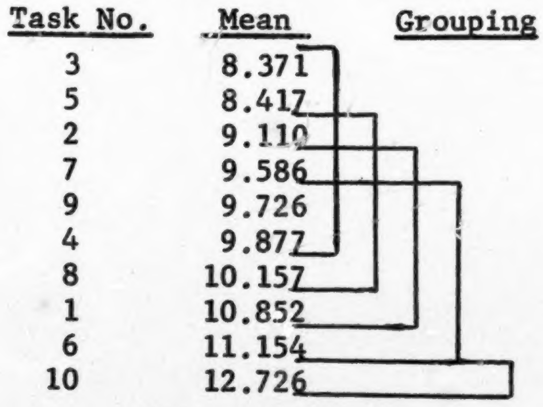
Analysis of Variance of Choice Standard Scores on Perception[1] (Creativity Level by Group Composition by Repeated Task)

Source	df	MS	F
Between Subjects			
Creativity Level (C)	1	.169	< 1
Group Composition (G)	2	.296	< 1
(C) x (G)	2	1.851	3.02#
Error (b)	24	.613	
Within Subjects			
Task (T)[2]	9	52.410	11.96***
(C) x (T)	9	5.070	1.16
(G) x (T)	18	3.846	< 1
(C) x (G) x (T)	18	3.960	< 1
Error (w)	216	4.331	

***$p < .001$
#$p < .10$

[1] Homogeneity of variance (Winer, 1962, p. 339): Error (b), F_{max} = 15.14, non-significant for 6 and 4 df at the .05 level; Error (w), F_{max} = 2.11, non-significant for 6 and 36 df at the .05 level.

[2] Grouping of task means by the Newman-Keuls method (Winer, 1962, p. 309) is as follows: Confidence coefficient, .95.



Task No.	Mean	Grouping
3	8.371	
5	8.417	
2	9.110	
7	9.586	
9	9.726	
4	9.877	
8	10.157	
1	10.852	
6	11.154	
10	12.726	

Table 20

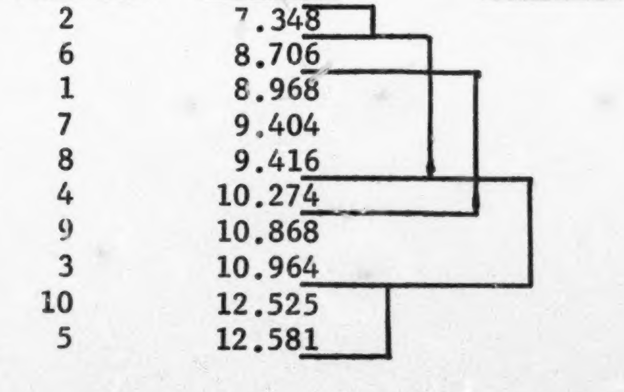
Analysis of Variance of Choice Standard Scores on Information[1]
(Creativity Level by Group Composition by Repeated Task)

Source	df	MS	F
Between Subjects			
Creativity Level (C)	1	18.226	5.18*
Group Composition (G)	2	.599	< 1
(C) x (G)	2	1.770	< 1
Error (b)	24	3.520	
Within Subjects			
Task (T)[2]	9	83.841	19.98***
(C) x (T)	9	4.450	1.06
(G) x (T)	18	3.256	< 1
(C) x (G) x (T)	18	4.195	< 1
Error (w)	216	4.196	

***$p < .001$
*$p < .05$

[1] Homogeneity of variance: Error (b), $F_{max} = 4.86$, non-significant for 6 and 4 df at the .05 level; Error (w), $F_{max} = 2.04$, non-significant for 6 and 36 df at the .05 level.

[2] Grouping of task means by the Newman-Keuls method. Confidence coefficient, .95.



Task No.	Mean	Grouping
2	7.348	
6	8.706	
1	8.968	
7	9.404	
8	9.416	
4	10.274	
9	10.868	
3	10.964	
10	12.525	
5	12.581	

subjects in that the high creative ones deviated more (mean, 10.352) than the low creative pupils (mean, 9.859). Variation among ten tasks was again significant.

Time Standard Scores on Perception: A Repeated Measurement Analysis. The results of this analysis are presented in Table 21. Other than the task variance, no main nor interaction effects were significant and the null hypotheses on creativity level and group composition had to be accepted.

Time Standard Scores on Information: A Repeated Measurement Analysis. The results, shown in Table 22, revealed the same non-significant pattern as that on perception tasks. Although there was significant variation among the ten tasks, no significant differences were detected either between the high creative and low creative target subjects or among the three friendship groups. The null hypotheses could not, again, be rejected.

In passing, it is to be remarked that grouping of task means by the Newman-Keuls method (Winer, 1962, p. 309) resulted in quite different results depending upon which standard score (choice or time) was used. Seemingly, there was no inherent ordering among ten tasks within each task category.

Creativity Level, Group Composition, and Task Category: An Overall Analysis in Terms of Standard Absolute Deviation Scores

Derivation of Standard Absolute Deviation Scores. The use of standard scores in the foregoing analyses did not preclude the possibility that positive and negative deviations balanced out to make all the means close to the anchor point. If, however, the direction of the deviation is ignored and the absolute values are used, the detection of group differences, if any,

Table 21

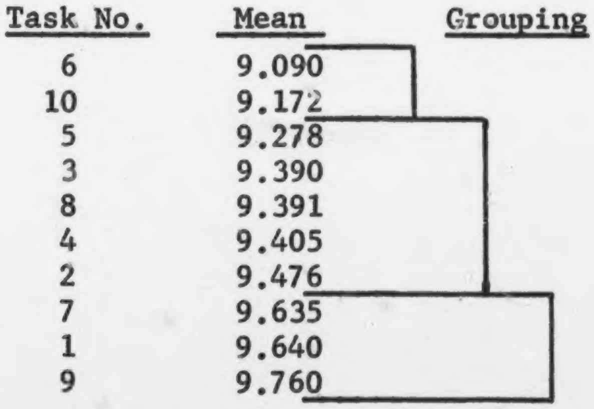
Analysis of Variance of Time Standard Scores on Perception[1]
(Creativity Level by Group Composition by Repeated Task)

Source	df	MS	F
Between Subjects			
Creativity Level (C)	1	.005	<1
Group Composition (G)	2	1.258	1.46
(C) x (G)	2	1.229	1.42
Error (b)	24	.863	
Within Subjects			
Task (T)[2]	9	1.351	16.95***
(C) x (T)	9	.078	<1
(G) x (T)	18	.106	1.34
(C) x (G) x (T)	18	.078	<1
Error (w)	216	.080	

***$p < .001$

[1] Homogeneity of variance: Error (b), $F_{max} = 44.44$, significant for 6 and 4 df at the .05 level; Error (w), $F_{max} = 9.75$, significant for 6 and 36 df at the .01 level. The logarithmic transofrmation was not effective in this case.

[2] Grouping of task means by the Newman-Keuls method. Confidence coefficient, .95.



Task No.	Mean	Grouping
6	9.090	
10	9.172	
5	9.278	
3	9.390	
8	9.391	
4	9.405	
2	9.476	
7	9.635	
1	9.640	
9	9.760	

Table 22

Analysis of Variance of Time Standard Score on Information[1]
(Creativity Level by Group Composition by Repeated Task)

Source	df	MS	F
Between Subjects			
Creativity Level (C)	1	.374	1.56
Group Composition (G)	2	.047	< 1
(C) x (G)	2	.038	< 1
Error (b)	24	.239	
Within Subjects			
Task (T)[2]	9	.518	5.08***
(C) x (T)	9	.066	< 1
(G) x (T)	18	.087	< 1
(C) x (G) x (T)	18	.067	< 1
Error (w)	216	.102	

***$p < .001$

[1] Homogeneity of variance: Error (b), $F_{max} = 4.70$, non-significant for 6 and 4 df at the .05 level; Error (w), $F_{max} = 11.75$, significant for 6 and 36 df at the .01 level.

[2] Grouping of task means by the Newman-Keuls method. Confidence coefficient, .95.

Task No.	Mean	Grouping	
8	9.449	┐	
6	9.466	│	
10	9.483	│	
9	9.520	│	
5	9.522	│	
3	9.606	│	┐
7	9.617	│	│
4	9.622	┘	│
2	9.805		│
1	9.816		┘

may become easier. For example, standard scores of 10.456 and 9.544 will give a mean score of 10.000 (no deviation from the anchor), while the same two scores will result in standard absolute deviation scores of .456 and .456 with a mean, naturally of .456. Taking absolute values of deviations tends to magnify the mean deviation, while reducing the variance.

For the analyses in this and subsequent sections, all standard scores were converted to standard absolute deviation scores by finding the absolute values of deviation in standard scores from its anchor point, 10.000. Since most time scores were deviating to one direction only (see p. 51), no analyses were made with time standard scores. All the results were based upon 60 experimental target subjects.

Choice Standard Absolute Deviation Scores: An Overall Analysis. The results of the overall analysis of the mean choice standard absolute deviation scores are presented in Table 23. None of the main or interaction effects was significant and the null hypotheses could not be rejected. This finding was consistent with that of an earlier three-way, fixed-effects analysis of the mean choice standard scores (Table 16).

Creativity Level, Group Composition, and Individual Tasks: Repeated Measurement Analyses in Terms of Standard Absolute Deviation Scores

The overall analysis in the previous section was made of the mean score obtained for each subject over ten tasks of the particular category (perception or information). In this section, each task category was handled separately and the subject's ten responses were treated as repeated measurements.

Table 23

Analysis of Variance of Mean Choice Standard Absolute Deviation Scores of Experimental Target Subjects[1]

Source	df	MS	F
Creativity Level (C)	1	.353	1.54
Group Composition (G)	2	.106	< 1
Task Category (T)	1	.004	< 1
(C) x (G)	2	.247	1.07
(G) x (T)	2	.040	< 1
(C) x (T)	1	.364	1.59
(C) x (G) x (T)	2	.019	< 1
Error	48	.230	

[1] Variance homogeneity, $F_{max} = 20.64$, non-significant for 12 and 4 df at the .05 level.

Choice Standard Absolute Deviation Scores on Perception: A Repeated Measurement Analysis. Table 24 gives the results of a three-way analysis (creativity level, group composition, and repeated measures on perception tasks). The creativity main effects were significant and indicated that the high creative subjects obtained a mean absolute deviation score (2.234) larger than that of the low creative subjects (1.925), regardless of the sociometric composition of the test group. In other words, the high creative subjects were less conforming than the low creative ones.

In addition, the among-task variance was significant ($p < .001$), but this was of no major interest in this particular project. No interaction effects were statistically significant.

Choice Standard Absolute Deviation Scores on Information: A Repeated Measurement Analysis. The results of this analysis, shown in Table 25, revealed significant task main effects and second-order interaction effects. With regard to the latter (creativity level by group composition by repeated task), further analyses for simple main effects (Winer, 1962, p. 310) indicated that the task effects were significant at every combination of creativity level and group composition.

A closer look at the significant second-order interaction is possible through Figure 2. When a test group was comprised of friends of the target subject, the mean absolute deviation score of the high creative group was larger than that of the low creative group on six of the ten tasks, smaller on three, and identical on one. Among neutral peers, on the other hand, the mean score of the high creative group was larger on four of the ten tasks, smaller on five,

Table 24

Analysis of Variance of Standard Absolute Deviation Scores on Perception[1]
(Creativity Level by Group Composition by Repeated Task)

Source	df	MS	F
Between Subjects			
Creativity Level (C)	1	7.184	5.31*
Group Composition (G)	2	1.367	1.01
(C) x (G)	2	.648	$<$ 1
Error (b)	24	1.354	
Within Subjects			
Task (T)[2]	9	6.697	4.59***
(C) x (T)	9	1.160	$<$ 1
(G) x (T)	18	1.038	$<$ 1
(C) x (G) x (T)	18	.584	$<$ 1
Error (w)	216	1.458	

***$p < .001$
*$p < .05$

[1] Homogeneity of variance: Error (b), $F_{max} = 11.42$, non-significant for 6 and 4 df at the .05 level; Error (w), $F_{max} = 1.40$, non-significant for 6 and 36 df at the .05 level.

[2] Grouping of task means by the Newman-Keuls method. Confidence coefficient, .95.

Task No.	Mean	Grouping
8	1.473	
4	1.549	
1	1.661	
7	1.827	
9	2.011	
6	2.079	
2	2.150	
5	2.611	
3	2.621	
10	2.811	

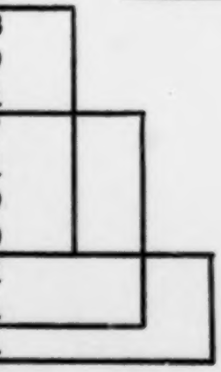


Table 25

Analysis of Variance of Standard Absolute Deviation Scores on Information[1]
(Creativity Level by Group Composition by Repeated Task)

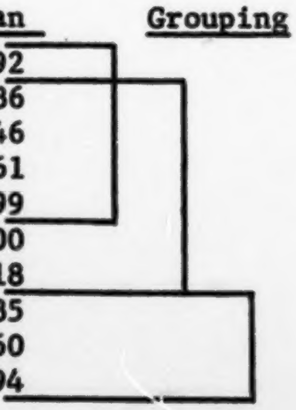
Source	df	MS	F
Between Subjects			
Creativity Level (C)	1	.000	< 1
Group Composition (G)	2	.086	< 1
(C) x (G)	2	2.011	< 1
Error (b)	24	3.242	
Within Subjects			
Task (T)[2]	9	21.980	15.50***
(C) x (T)	9	1.459	1.03
(G) x (T)	18	1.209	< 1
(C) x (G) x (T)	18	2.601	1.83*
Error (w)	216	1.418	

***$p < .001$
*$p < .05$

[1] Homogeneity of variance: Error (b), $F_{max} = 5.87$, non-significant for 6 and 4 df at the .05 level; Error (w), $F_{max} = 1.49$, non-significant for 6 and 36 df at the .05 level.

[2] Grouping of task means by the Newman-Keuls method. Confidence coefficient, .95.

Task No.	Mean	Grouping
4	.992	
7	1.336	
3	1.346	
8	1.561	
6	1.799	
1	2.000	
9	2.018	
2	2.835	
5	3.260	
10	3.494	



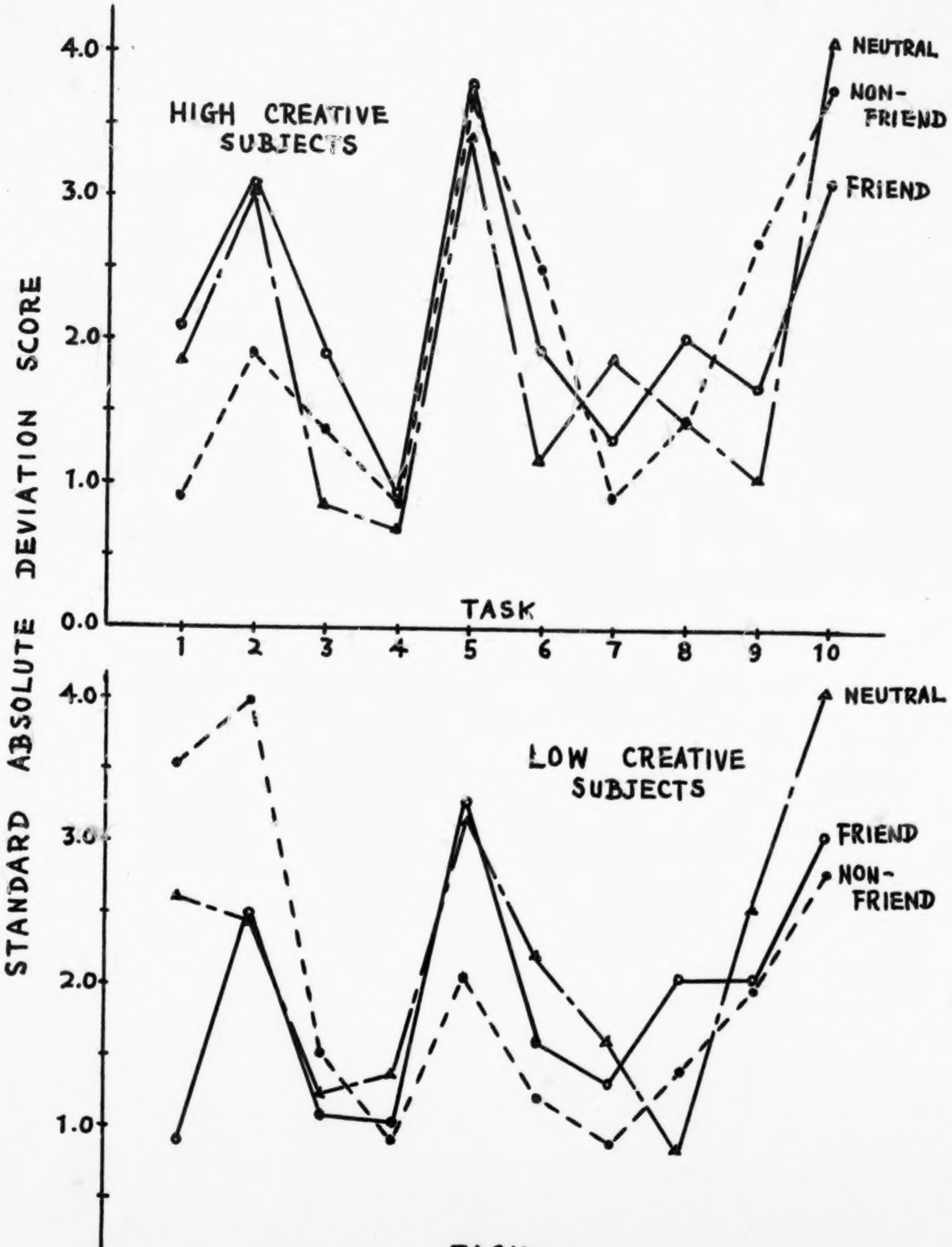


Fig. 2. Creativity level by group composition by task interaction on information when standard absolute deviation scores were employed.

and identical on one. Finally, with non-friends, the mean for the high creative group was larger on five tasks, smaller on four, and identical on one. Although the dependent nature of the ten responses does not allow a simple calculation of the probability of obtaining these events, it may be suggested that the behaviors of the target subjects in relation to their creativity level were most clearly differentiable in the friend-group environment where the high creative subjects revealed generally larger deviations than did their low creative counterparts.

To rephrase, for the high creative subjects, the largest mean absolute deviation score was recorded in the friend group on six out of the ten tasks, in the neutral group on two, and in the non-friend group on two. The smallest score was obtained in the friend group on one, in the neutral group on five, and in the non-friend group on three. Seemingly, then, the high creative subjects showed the largest amount of deviation when they were with their friends and the smallest when with neutral peers.

For the low creative subjects, on the other hand, the largest deviation was recorded in the friend group on two out of the ten tasks, in the neutral group on five, and in the non-friend on three. The smallest score was obtained in the friend group on two tasks, in the neutral group on two, and in the non-friend group on six. The low creative subjects would therefore appear to have conformed least when they were with non-friends and most when with neutrals.

The above results are not directly comparable with those reported earlier (Tables 19 and 20) for choice standard scores because of the differences in score format. Together, however, these tend to suggest the complex nature of the conforming behavior as a function of, among other things, creativity level, measures of response shifting, tasks, and group composition (Blake & Mouton, 1961; Walker & Heyns, 1962).

Supplementary Analyses: Group Pressure, Sex, and Task Subtype

Degree of Group Pressure and Conforming Behavior

As elaborated earlier (Table 10), a target subject's turn of responses in the experiment was randomly varied between the second position and the fifth. This meant that, on some of the tasks, the subject had seen only one blue lamp (faking one other member's response) before he responded while, on other tasks, four blue lamps (all others' responses) had been on when his turn came, and so on. Operationally, therefore, the degree of group pressure exerted upon any target subject may be expressed by the number of blue lamps preceding his choice, namely, one (least pressure) to four (most pressure), if it is assumed that each of the ten tasks represented identical stimulus value (such as the difficulty level, amount of information, etc.).

Since ten tasks within each task category were not one and the same, application of trend analytic techniques was deemed inadvisable. Instead, a simple correlation ratio was computed under the assumption of the absence of any carry-over effects (practice, fatigue, etc.) from one task to another. Because of the inevitable confounding with these and other variables, the results should be regarded as tentative.

Table 26 and Figure 3 reveal significant correlation ratios on both perception and information tasks when standard scores (choice and time) were used in the analyses of responses from 60 experimental target subjects. Mean scores of the two (high and low) creative groups followed quite similar trends over the pressure range. The relationships between group pressure and conformity were curvilinear on both tasks even though no simple, common trend was observable. On perception, the largest deviation in terms of choice (from 10.000) was shown when the pressure was the least, while it was revealed on information when the pressure was the greatest. The direction of the deviation did not follow any clearcut patterns. With regard to time, on the other hand, all deviations were to the same direction (shorter reaction time) and the largest values were given on perception when the pressure was either the smallest or the largest, and on information when the pressure was large.

The use of the absolute deviation score for choice, on the other hand, led to generally non-significant correlation ratios, the only exception being for the high creative group responding to the preception tasks. Nevertheless, the analysis suggested that the relationship between pressure and the criterion score was considerably higher on both types of tasks for high creative subjects than for low creative ones.

Sex Composition of Group and Conformity

As mentioned earlier (p. 29), the dominance of the same-sex patterns of peer nominations among the subjects forced the investigators to give up their original plan of composing the experimental test groups with two boys

Table 26

Correlation Ratios between Group Pressure and Criterion Scores

Task Category	Creativity Level	Group Pressure	Task No.	N^1	Choice Std. Score		Time Std. Score		Choice Abs. Dev. Score	
					Mean	E	Mean	E	Mean	E
Perception	High	1	4,10	30	11.423	.35**	9.316	.29**	2.487	.23*
		2	2,8	30	10.135		9.453		1.745	
		3	3,7,9	45	8.871		9.546		2.478	
		4	1,5,6	45	10.004		9.339		2.148	
	Low	1	4,10	30	11.180	.31**	9.260	.28**	1.874	.09
		2	2,8	30	9.132		9.415		1.879	
		3	3,7,9	45	9.584		9.643		1.828	
		4	1,5,6	45	10.278		9.333		2.086	
Information	High	1	1,3	30	10.309	.38**	9.658	.25*	1.512	.20
		2	2,7	30	8.638		9.658		2.034	
		3	5,6,8	45	10.445		9.484		2.403	
		4	4,9,10	45	11.430		9.490		2.111	
	Low	1	1,3	30	9.623	.40**	9.763	.35**	1.836	.02
		2	2,7	30	8.114		9.765		2.137	
		3	5,6,8	45	10.024		9.474		2.010	
		4	4,9,10	45	11.015		9.593		2.225	

**$p < .01$

*$p < .05$

[1] Total number of responses and not of individual target subjects.

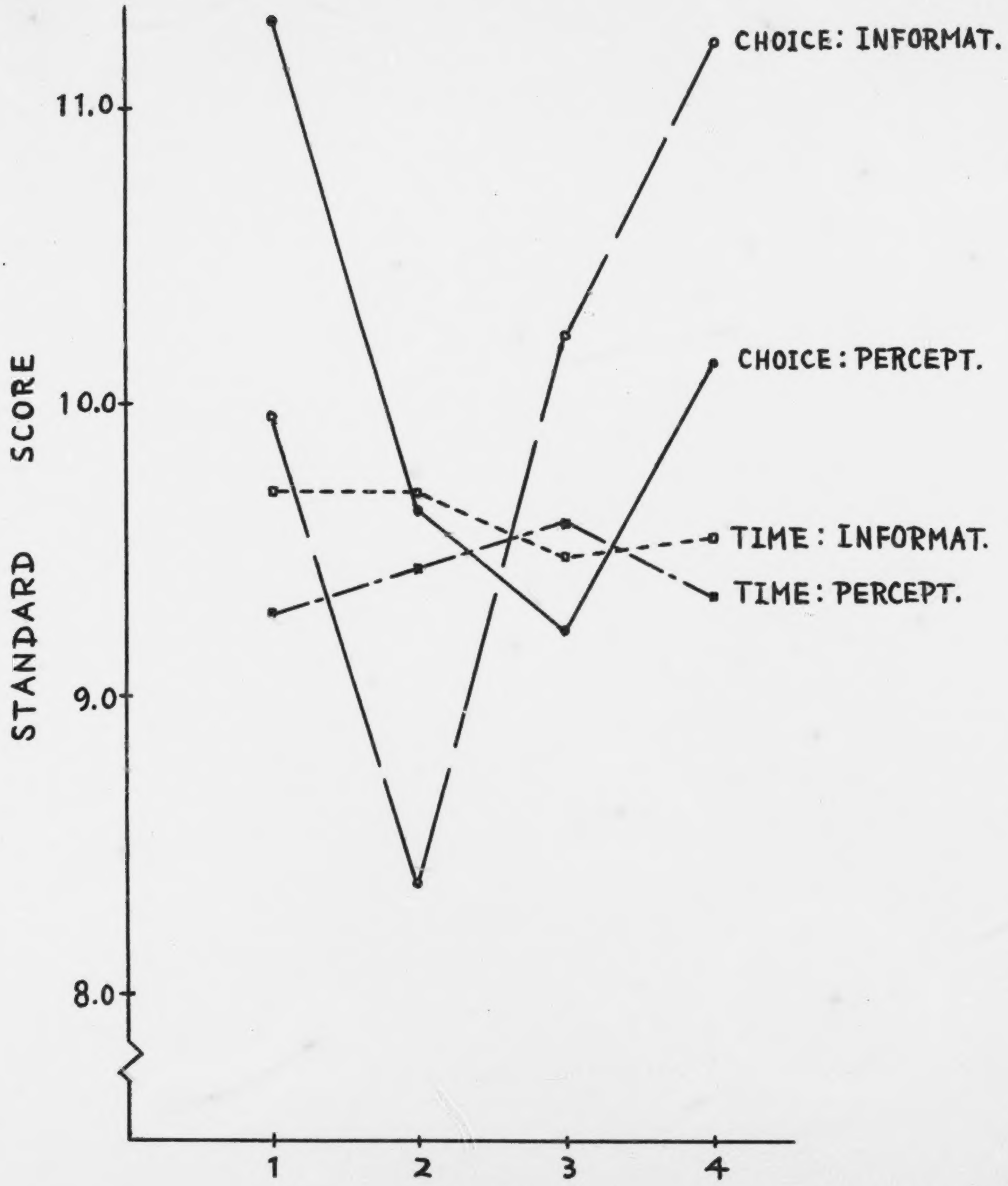


Fig. 3. Group pressure and choice and time standard scores for perception and information tasks (combined high and low creative groups).

and two girls, in addition to a target subject. The plan would have allowed the control of the effects, if any, of varied sex composition but, in absence of such control, the best which could be done was to examine the possible effects of this source of variation.

For the purpose of this analysis, results from all 74 experimental target subjects were utilized. As much as the sociometric composition (friend, neutral, non-friend) proved to be a non-significant variance source in every major analysis in the foregoing sections, the responses were pooled across the three sociometric categories and correlation ratios were computed between the sex composition variable and criterion scores on the experiment.

The results, presented in Table 27, indicated that none of the six correlation ratios was significant on perception tasks, regardless of the level of the target subjects' creativity, and that all but one were likewise non-significant for information. The only exception was found on information tasks for the low creative group when their choice responses were analyzed in the form of the standard absolute deviation score. In this case, there was a more or less linear relation ($E = .68$) between the sex composition and the absolute deviation to yield the largest deviation when the target subject did not have any other member of the same sex in his or her group and the smallest when the four members were of the same sex as the target subject.

In general, however, the results would seem to agree with those of Tuddenham, Macbride, and Zahn (1958) in suggesting that the sex composition of the group may not be as crucial a variable as other intra-personal determinants. No clear support was rendered for Luchins and Luchins (1955) and

Table 27

Correlation Ratios between Sex Composition of Test Groups and Criterion Scores[1]

Task Category	Creativity Level	Sex Composition	N[2]	Choice Std. Score		Time Std. Score		Choice Abs. Dev. Score	
				Mean	E	Mean	E	Mean	E
Perception	High	4S[3]	4	10.148	.44	9.325	.38	1.926	.27
		3S	1	9.892		9.262		2.067	
		2S	6	10.068		9.502		2.048	
		1S	3	10.444		9.443		2.083	
		OS	5	9.548		9.430		2.230	
	Low	4S	4	9.606	.56	9.239	.46	1.828	.57
		3S	3	9.543		9.455		2.188	
		2S	4	10.073		9.588		2.179	
		1S	4	10.288		9.557		1.872	
		OS	2	10.665		9.203		1.503	
Information	High	4S	4	10.601	.67	9.577	.58	1.976	.56
		3S	3	9.714		9.609		2.535	
		2S	3	9.997		9.548		1.911	
		1S	3	10.056		9.389		2.429	
		OS	5	10.676		9.644		1.886	
	Low	4S	3	9.686	.31	9.688	.29	1.483	.68*
		3S	2	9.696		9.582		1.693	
		2S	5	10.198		9.623		2.220	
		1S	5	9.915		9.698		2.245	
		OS	5	10.112		9.626		2.523	

*$p < .05$

[1] For each target subject, the mean score over ten tasks was used in the analyses.

[2] Number of target subjects, or test groups.

[3] 4S denotes those test groups in which four members were of the same sex as the target subject; OS, those in which four members were all of the opposite sex; and so on.

Reitan and Shaw (1964) in their contention that both sexes conform more in mixed-sex than in same-sex groups.

Perception Task Subtype and Conformity

In the present study, three subtypes of tasks (recognition, puzzle A, and puzzle B) made up the task category of perception (see p. 34). In view of the irregular groupings among task means revealed in the repeated measurement analyses in the preceding pages, it was deemed rather unlikely that the task subtypes on perception were systematic contributors to the significant task main effects. It was, nevertheless, decided to run a simple, correlational analysis to examine the presence or absence of any remarkable, though confounded, association between this variable and the criterion measures of conformity among the 60 experimental target subjects.

The results of the analysis are presented in Table 28 and Figure 4. On choice standard scores, the correlation ratios were non-significant both for the high creative and low creative groups, while they were significant for both groups when time standard scores were used. The trends for high and low creative subjects were quite similar and larger deviations from the anchor point (10.000) were shown on the puzzle A and B type tasks than on the recognition tasks.

When choice absolute deviation scores were analyzed, on the other hand, the correlation ratio was significant only for the high creative group, although the trend shown by the low creative group closely followed that of the high creative one. The largest absolute deviation was identified with puzzle B tasks where the subjects were required to choose one set of pieces from among seven which does not fit together.

Table 28

Correlation Ratios between Perception Task Subtypes and Criterion Scores

Creativity Level	Task Subtype	Task No.	N^1	Choice Std. Score		Time Std. Score		Choice Abs. Dev. Score	
				Mean	E	Mean	E	Mean	E
High	Recognition	1,2,7	45	9.869		9.585		1.978	
	Puzzle A	3,4,6,8	60	9.770	.10	9.327	.33**	2.062	.26**
	Puzzle B	5,9,10	45	10.351		9.377		2.720	
Low	Recognition	1,2,7	45	9.829		9.582		1.781	
	Puzzle A	3,4,6,8	60	10.010	.07	9.311	.21*	1.799	.17
	Puzzle B	5,9,10	45	10.229		9.430		2.236	

**$p < .01$

*$p < .05$

[1] Total number of responses over the specified tasks.

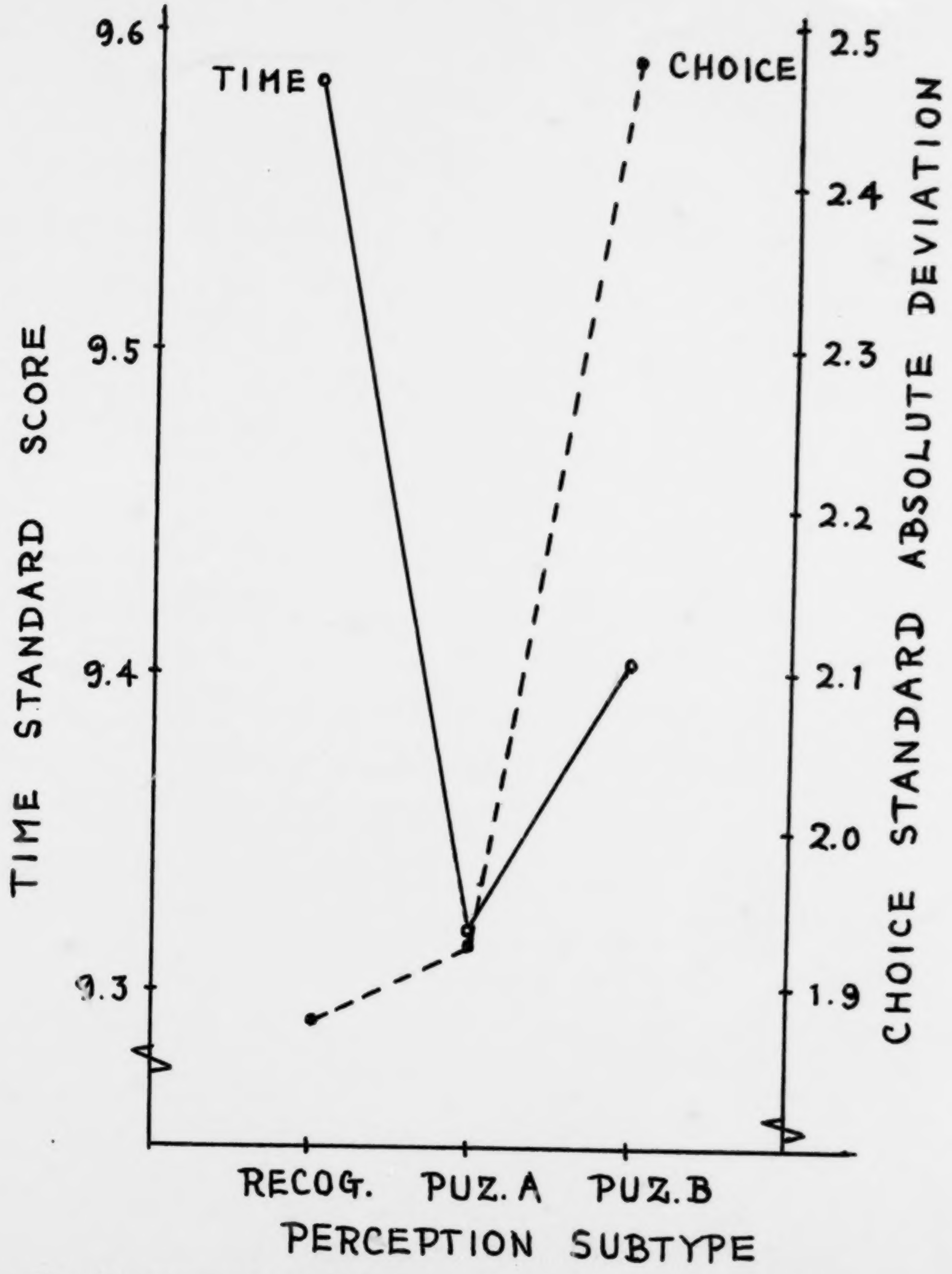


Fig. 4. Perception task subtypes (recognition, puzzle A, and puzzle B) and time standard score and choice standard absolute deviation score (combined high and low creative groups).

In passing, it should be observed the size of correlation ratios was higher for the high creative group than for the low creative group, regardless of the score format employed in the analysis.

CHAPTER IV

SUMMARY, DISCUSSION, AND CONCLUSIONS

Summary of Findings

For the total 827 subjects, the mean IQ was 110.20 and the mean creativity score was 183.50, the correlation between these two scores being .22 ($p < .01$). In terms of their reported family background, the three creativity groups (A, M, and Z) were not significantly different on the mean number of siblings and father's occupation. A comparison on mother's occupation suggested that the middle creative group (M) has the highest proportion of full-time (housewife) mothers (77 per cent vs. 73 for the other two groups) and of those in clerical-sales occupations (ten vs. six for the other two). The high creative group (A) reported the highest proportion of mothers in professional occupations (ten per cent vs. five and six for, respectively, groups M and Z), while the low creative group (Z) had the highest proportion of mothers in service occupations (nine per cent vs. five and four for, respectively, groups A and Z).

Children's own vocational aspiration revealed interesting results. The proportion of those aspiring to do some professional work decreased steadily from group A (76 per cent) to group M (62 per cent) to group Z (49 per cent), while the proportion of skilled-labor aspirants showed an opposite trend (10 for A, 13 for M, and 15 for Z). It was further observed that the proportion of those answering "I do not know" increased sharply from group A (2 per cent) to group M (8 per cent) and to group Z (19 per cent).

The results of the small-group experiments were analyzed in various ways. In addition to the raw scores on choice and time, two kinds of scores were employed in the analyses, both of them utilizing the responses from the control target subjects as their reference points. The "standard scores" were derived from raw scores by linearly converting the latter (for time, after a logarithmic transformation) into a system with a mean of ten and a standard deviation of two on the basis of the control subjects' scores. The "standard absolute deviation scores" were derived by taking the absolute values of the differences between the standard scores and their anchor point, namely, ten.

A-1. First, in the preliminary analysis, the correlations between IQ and raw criterion scores (both choice and time) were found to be quite low and non-significant both for perception and information tasks (Table 11).

In the major analyses, three forms of criterion measures were employed, namely, agreement with faked norms (for choice only), standard score with the control's response as the anchor (for choice and time), and standard absolute deviation score (for choice only). For the latter two kinds of scores, both overall analyses (creativity by group composition by task type) and repeated measurement analyses (for each task type separately; creativity by group composition by repeated task) were carried out.

B-2. In terms of the proportion of those agreeing with the presented norms, faking the group judgment, there was no significant difference between the high and low creative subjects on either perception tasks or information tasks (Table 12).

B-2. An overall analysis of choice standard scores revealed no significant effects (Table 16), while that of time standard scores indicated significant task type main effects (Table 18). Although most experimental target subjects reacted in less time than control subjects, the mean depression in reaction time was larger on perception tasks than on information tasks.

B-3. A repeated measurement analysis of choice standard scores on perception (Table 19) indicated that the creativity by group composition effects were almost significant. The high creative subjects deviated most when they were with their non-friend classmates, while the low creative subjects deviated most when they were with their friends. Both groups of subjects deviated least when they were with their neutral peers.

A similar analysis of choice standard scores on information (Table 20) showed significant creativity main effects in that the high creative subjects deviated more than the low creative subjects.

No significant effects of interest were detected on repeated measurement analyses of time standard scores on perception (Table 21) and on information (Table 22).

B-4. An overall analysis of choice standard absolute deviation scores revealed no significant main nor interaction effects whatsoever (Table 23).

B-5. A repeated measurement analysis of choice standard absolute deviation scores on perception (Table 24) revealed significant creativity main effects. The high creative subjects obtained a larger mean absolute deviation score than the low creative subjects.

A similar analysis of choice standard absolute deviation scores on information (Table 25) indicated significant second-order interaction effects (creativity by group composition by repeated task). The high creative subjects seemed to deviate most when they were with their friends and least when with neutral peers, while the low creative subjects deviated most when with non-friends and least when with neutrals.

C-1. In a supplementary analysis of the relationship between group pressure and conformity (Table 26), it was suggested that, on both perception and information, there were curvilinear relations (high and/or low extremes of pressure being associated with larger conformity) when standard scores were employed. Both high and low creative subjects revealed essentially the same trends, even though there was no correspondence between the two task types.

The use of the choice standard absolute deviation scores, on the other hand, indicated generally non-significant results. The relationship was higher in this instance for the high creative group on both task types than for the low creative group.

C-2. Another supplementary analysis was made of the possible relationship between sex composition of the test group and conformity (Table 27). In general, the correlation ratios were non-significant on both tasks and for both creativity groups.

C-3. The last supplementary analysis concerned the three subtypes of the perception task (recognition, puzzle A, and puzzle B). The results of the analysis (Table 28) indicated that the correlation ratios were higher for the high creative group than for the low group on all three forms of the criterion measure, although statistical significance was attained only with the time standard scores and with the choice standard absolute deviation scores.

Discussion

Implications of Findings

With regard to observations about the subjects' background, the implications were already discussed in pages 22 through 28. Accordingly, the discussion in this section will be limited to the findings from the group-pressure experiments.

At the beginning of the study, a question was asked whether creativity level of children, sociometric composition of the test group, and type of tasks are associated with fifth-graders' peer conforming behaviors in a small group situation. In general, the answer would appear to be affirmative (see B-3 and B-5 in the preceding section) so long as these variables are looked at in their interaction. In this sense, the findings are in rough agreement with previous findings for college students and adults by Barron (1953), Birney and Houston (1961), Crutchfield (1955; 1963), and Rutherford (1960). Nevertheless, it seems highly desirable to emphasize the importance of a qualifying statement, "but, to be exact, it all depends," to be attached to any conclusion.

It depends, first of all, on the choice of the criterion measure of conformity. Among the several possible ways of measuring response shifts (Blake & Mouton, 1961, pp. 224-226), the present study employed three, namely, agreement with the faked group norms, experimental subjects' performance under group pressure in reference to control subjects' reaction under no pressure (directionality of deviation conserved), and the absolute deviation (direction of deviation ignored) of experimental subjects' responses in reference to those of controls. Results were quite varied depending upon which score was used as the criterion and no simple generalization across the three score forms was feasible. Whether the choice in this study of the particular indices of group conformity was favorable for detection of behavioral differences among the particular subjects under the particular testing condition is naturally difficult to state without further studies. In future research, it seems desirable also to examine the possibility that the control subjects' responses, handled indiscriminately in the present investigation, are themselves dependent upon their creativity level. If such is indeed the case, the use of separate anchor points for the two or more experimental subgroups of different creativity levels would obviously be indicated.

The nature of the tasks was apparently one of the relevant determinants of the subjects' reaction. Seemingly, the perception tasks were more ambiguous than the information tasks and did not easily avail themselves of any logical analysis, if such was at all possible. In contrast, the information tasks appeared more amenable to reasoning approaches and, hence, to engendering some sense of confidence in one's response. It has been observed that "the more ambiguous the situation, the more vague and numerous the alternate courses of action open to a person, the more the conformity in response to social pressure" (Walker & Heyns, 1962, p. 95). Some evidence to support this statement was available in the findings of the present study (see, e.g., B-2, B-3, and B-5).

The nature of one's group was another important variable. The interactions, observed in the present study (B-3 and B-5), between creativity level of a subject and sociometric composition of his group, strongly indicate further exploration of this source (Wilson, 1960) of behavior modification. It should also be noted here that, in future studies, the situation may be analyzed from the reference group viewpoint (Siegel & Siegel, 1957) to enable more precise predictions of subjects' responses in terms of the agreement-disagreement between their membership group (actual test group) and their reference group (e.g., friends group). Interactions between the immediate social context of a subject and his life history (Marek, 1963) may also be subjected to careful scrutiny.

"Laboratory situations are relatively bland as far as involvement is concerned, at least in comparison with lifelike settings where the personal stakes connected with conformity, compliance, and conversion are higher" (Blake & Mouton, 1961, p. 268). Under the particular experimental conditions, conformity behavior was not directly instrumental to any explicit goals--be they acceptance by the group or favorable reaction from the experimenter or teacher. As such, movement from one's original position to the one given as other members' choice was neither imperative nor highly meaningful (Walker & Heyns, 1962). The situation did not reinforce the "informational" or purposive aspects of conforming behavior while, at the same time, it did not maximize opportunities for "normative" influence for conformity (Deutsch & Gerard, 1955).

In spite of the small-group setting of the experiments, the problems remained essentially individual in nature instead of enrolling all the members as a working group. Also, the task-centered experimental climate should have worked against eliciting greater yielding (Asch, 1953; Thibaut & Strickland, 1956). Further, the selection of the particular, normatively infrequent choices as the faked group norm may have resulted in too large discrepancies between subjects' original (in this case, control's) idea about the "right" choice and the presented one. Under such condition, it has been shown that the group pressure may not only become less effective (Helson, Blake & Mouton, 1958) but also elicit reverse effects or pressure toward non-conformity (Walker & Heyns, 1962, p. 95).

The atheoretical nature of the present study should be apparent. In future replications and extensions, it would be highly desirable not only to couch the experimental design in some theoretical frame such as reference group theory (Sherif & Sherif, 1964), cognitive dissonance theory (Festinger, 1957), adaptation level theory (Helson, 1964), or conflict model (Cohen, 1963), but also to deduce the hypotheses concerning creativity from an integrated viewpoint on personality.

For one thing, as Pemberton (1963) puts it, "It is necessary, however, that we distinguish two levels of conformity: thinking and doing. Creative students are not necessarily nonconformist in social behavior, only in ideas " (p. 52), and "They are at the same time academically conforming and intellectually nonconforming--social realists and intellectual idealists" (p. 67). When creativity tests of essentially cognitive nature are used to identify the creative subjects, they may not be expected to reveal social non-conformity as strongly as when these subjects are selected on the basis of some social-personality type measures of creativity. This is especially relevant since it has been argued (Cattell, 1963) that the difference between the creative and the routine, competent individual lies far more in the realm of personality than in the realm of special abilities.

For another, the construct of creativity must be incorporated into an overarching theory of personality which can make a meaningful whole out of the diversified variables found to be related with conforming behaviors. Other than creativity, these include such variables as dependency (Jakubczak & Walters, 1959; McDavid & Sistrunk, 1964), anxiety (Walters, Marshall, & Shooter, 1960), closure-seeking (McDavid & Sistrunk, 1964), self-confidence (Berkowitz & Lundi, 1957; Hochbaum, 1954; League & Jackson, 1964; London & Lim, 1964), and several others (Blake & Mouton, 1961; Tuddenham, 1959). Together with analyses of the particular tasks and of the social-situational conditions, such integrative theory of personality should in the long run enable us to understand fully the intricacies of human behavior revealed in productive vs. non-productive conformity (Pepinsky, 1960; Pepinsky, 1961) or conformity vs. counterformity (Crutchfield, 1963). Most probably, social conformity as well as creativity would be better understood as instrumental acts to attain a specific goal (Walker & Heyns, 1962) rather than as static traits or factors. Inquiry into the process of conforming behavior need not directly be concerned with whether such acts are regarded desirable or undesirable. "The reasonable implication is that 'conformity' is not solely the province of the anxious, the dependent, the maladjusted; unwitting conformity in the face of ambiguity may be so, but conformity to the socially accepted demands of clearly defined situations seems a perfectly healthy response for a child (or for an adult, for that matter)" (Campbell, 1964, p. 312). In this context, creative behaviors need not always be an antithesis of conforming acts.

Experimental Investigation of Interpersonal Influence

The present study agrees with several previous projects (Berenda, 1950; Iscoe & Hodgden, 1960; Iscoe, Williams, & Harvey, 1963; Iscoe, Williams, & Harvey, 1964) in making it clear that the application of the group-pressure experiment method to children is not only generally feasible but also quite useful in explicating the roles of creative thinking and/or personality in social behaviors of children. This approach, with its controlled features, would seem to be especially valuable in a systematic investigation of the limiting conditions of numerous relevant variables. Replication and extension of the present study is therefore strongly indicated.

Before concluding the discussion, however, it is both necessary and pertinent to consider the matter of the "hoax" involved in the experimental procedures. As elaborated earlier, pre-selected choice patterns were faked as other group members' actual choices. Each of the seven possible choices on each task looked quite "reasonable" and it was difficult to pinpoint the correct choice with confidence. Further, the original problem slide had been taken away, when the subjects were making their choice, to minimize the possibility of deliberate confirmation. When the experiment was over, subjects were asked whether they had enjoyed the experience and, without exception, the subjects indicated their enthusiasm for the "new and different way to answer questions" and showed mild disappointment for not being given "more puzzles to solve." The plausible but irrelevant interpretation seemed to have satisfied the subjects and any discussion and explanation of the experience, offered their classmates and overheard by the "liaison" experimenter, centered around these two points, namely, pushing buttons to light up lamps to answer interesting puzzles. There was no indication of awareness of the real nature of the experiment or of any negative reaction to the event.

A question may be raised by some readers about the "deception of naive subjects" in the group-pressure experiment. Being fully aware of the ethical obligation and humane interests of psychologists, the position taken in this report would nevertheless be that presentation of misinformation (or noise) does not, in and of itself, constitute cheating nor represent deception. For one thing, the investigator's intention was not to gain personal advantage and, for another, the entire experiment was undertaken in a professional but relaxed atmosphere engendered in the children's familiar school environment through cooperation with the children themselves and their teachers. In this sense, the situation was not totally unlike the familiar "parental falsification" in homes where parents in all sincerity and goodwill, resort to a certain amount of misrepresentation and/or withholding of information concerning accidents, divorce, death, sickness, and other facts of life, both serious and routine. The act itself, in such a context, does not make the parents immoral or unethical and, in most cases, does not seem to hurt children badly and permanently.

No child can escape being affected by and affecting others consciously or unconsciously in social interactions. In the particular social situation, no confederates were used so as not to turn children against children and no controversial problems were included. Children were "free to use conforming or non-conforming behavior" (Starkweather & Cowling, 1964, p. 171) as they saw fit and to react "in a manner consistent with well established patterns of behavior" (Milgram, 1964, p. 850). There seems to be no reason to regard the social setting of the testing as something radically different from these children's daily interactions with adults and peers. Judging from the findings of a previous study (Tuddenham & McBride, 1959), the most significant "deception" may be that ascribable to subjects themselves rather than to the inherent nature of the experiment. "One of the unexpected outcomes of our analysis was the repeated finding of typical 'independent' statements by Ss who in fact had high and even rather extreme yielding scores" (Tuddenham & McBride, 1959, p. 269).

To summarize, children (or any other, so-called "subjects") are not passively and blindly controlled by the presented information on group reaction but they were instead actively engaged in information processing and problem solving, at the same time influencing both other children and adults (or "experimenters") in the social setting. The situation may be interpreted as a special case of "awareness contexts" which were defined by

Glaser and Strauss (1964) as "the total combination of what specific people, groups, organizations, communities or nations know what about a specific issue" (p. 670). In other words, as expressed by Milgram (1964) in his reply to Baumrind's criticism (1964) of the obedience studies on ethical grounds, the subject is not a passive creature, completely and innocently controlled by the experimenter. Rahter, he is an active, choosing individual, free and capable of either accepting or rejecting the experimental prescriptions for action.

To put it in still another way, it seems too naive of any investigator to believe that he is the one presenting a show to a submissive and gullible audience to command their attention and appreciation. The fact of the matter is that he is dealing with an "obstinate audience" (Bauer, 1964) which often defines the interactions and leads the actor. "Thus, who is really being 'taken in' is a matter of the awareness of both parties to the situation" (Glaser & Strauss, 1964, p. 670). Most probably, the question of ethics in social and psychological research must be answered at a deeper level of the reality of human experience than at the immediately apparent and abstract level of dignity, privacy, and safety.

REFERENCES

Asch, S. E. Effects of group pressure upon the modification and distortion of judgments. In D. Cartwright & A. Zander (Eds.), *Group dynamics*. Evanston, Illinois: Row, Peterson, 1953. Pp. 151-162.

Barron, F. Some personality correlates of independence of judgment. *Journal of Personality*, 1953, *21*, 287-297.

Barron, F. Originality in relation to personality and intellect. *Journal of Personality*, 1957, *25*, 730-742.

Barron, F. The psychology of imagination. *Scientific American*, 1958, *199*, 151-166.

Bauer, R. A. The obstinate audience: the influence process from the point of view of social communication. *American Psychologist*, 1964, *19*, 319-328.

Baumrind, Diana. Some thoughts on ethics of research: after reading Milgram's "Behavioral study of obedience." *American Psychologist*, 1964, *19*, 421-423.

Berenda, Ruth W. *The influence of the group on the judgments of children*. New York: Kings Crown Press, Columbia University, 1950.

Berkowitz, L., & Lundi, R. M. Personality characteristics related to susceptibility to influence by peers or authority figures. *Journal of Personality*, 1957, *25*, 306-316.

Birney, R. C., & Houston, J. P. The effects of creativity, norm distance, and instructions on social influence. *Journal of Personality*, 1961, *29*, 294-302.

Blake, R. R., Helson, H., & Mouton, Jane S. The generality of conformity behavior as a function of factual anchorage, difficulty of task, and amount of social pressure. *Journal of Personality*, 1957, *25* 294-305.

Blake, R. R., & Mouton, Jane S. The experimental investigation of interpersonal influence. In A. D. Biderman & H. Zimmer (Eds.), *The manipulation of human behavior*. New York: Wiley, 1961. Pp. 216-276.

Bonney, M. E. The relative stability of social, intellectual, and academic status in Grades II to IV, and the interrelationships between these various forms of growth. Journal of Educational Psychology, 1943, 34, 88-102.

Campbell, J. D. Peer relations in childhood. In M. L. Hoffman & Lois W. Hoffman (Eds.), Review of child development research. Vol. 1. New York: Russell Sage Foundation, 1964. Pp. 289-322.

Cannon, K. L. Stability of sociometric scores of high school students. Journal of Educational Research, 1958, 52, 43-48.

Cattell, R. B. The personality and motivation of the researcher from measurements of contemporaries and from biography. In C. W. Taylor & F. Barron (Eds.), Scientific creativity. New York: Wiley, 1963, Pp. 119-131.

Cohen, B. P. Conflict and conformity: a probability model and its application. Cambridge, Mass.: M. I. T. Press, 1963.

Crutchfield, R. S. Conformity and character. American Psychologist, 1955, 10, 191-198.

Crutchfield, R. S. Conformity and creative thinking. In H. E. Gruber, G. Terrell, & M. Wertheimer (Eds.), Contemporary approaches to creative thinking. New York: Atherton Press, 1963. Pp. 120-140.

Deutsch, M., & Gerard, H. B. A study of normative and informational social influence upon individual judgment. Journal of Abnormal and Social Psychology, 1955, 51, 629-636.

Edwards, A. Experimental design in psychological research. (2nd ed.) New York: Holt, Rinehart, & Winston, 1960.

Festinger, L. A theory of cognitive dissonance. Evanston, Ill.: Row, Peterson, 1957.

Fisher, S., Williams, H. L., & Lubin, A. Personal predictors of susceptibility to social influence. American Pyschologist, 1957, 12, 360. (Abstract)

Getzels, J. W., & Jackson, P. W. Creativity and intelligence. New York: Wiley, 1962.

Ginzberg, E., Ginsburg, S. W., Axelrad, S., & Herma, J. I. Occupational choice: an approach to a general theory. New York: Columbia Univer. Press, 1951.

Glazer, B. G., & Strauss, A. L. Awareness contexts and social interaction. *American Sociological Review*, 1964, *29*, 669-679.

Gronlund, N. E. *Sociometry in the classroom*. New York: Harper, 1959.

Helson, H. *Adaptation level theory: an experimental and systematic approach to behavior*. New York: Harper, 1964.

Helson, H., Blake, R. R., & Mouton, Jane S. An experimental investigation of the effectiveness of the "big lie" in shifting attitudes. *Journal of Social Psychology*, 1958, *48*, 51-60.

Hochbaum, G. M. The relation between group members' self-confidence and their reactions to group pressures to uniformity. *American Sociological Review*, 1954, *19*, 678-687.

Holland, J. L., & Nichols, R. C. The development and validation of an indecision scale: the natural history of a problem in basic research. *Journal of Counseling Psychology*, 1964, *11*, 27-34.

Holland, J. L. Some explorations of a theory of vocational choice: I. One- and two-year longitudinal studies. *Psychological Monograph*, 1962, *76* (26, Whole 545).

Hollingshead, A. B. *Elmtown's youth*. New York: Wiley, 1949.

Hunt, J. McV., & Solomon, R. L. The stability and some correlates of group-status in a summer-camp group of young boys. *American Journal of Psychology*, 1942, *55*, 33-45.

Iscoe, I., & Hodgden, L. Use of the simulated group technique with children. *Psychological Reports*, 1960, *6*, 175-178.

Iscoe, I., Williams, Martha, & Harvey, J. Modification of children's judgments by a simulated group technique: a normative developmental study. *Child Development*, 1963, *34*, 963-978.

Iscoe, I., Williams, Martha, & Harvey, J. Age, intelligence, and sex as variables in the conformity behavior of Negro and white children. *Child Development*, 1964, *35*, 451-460.

Jakubczak, L. F., & Walters, R. H. Suggestibility and dependency behavior. *Journal of Abnormal and Social Psychology*, 1959, *59*, 102-107.

Jenness, A. The role of discussion in changing opinions regarding a matter of fact. *Journal of Abnormal and Social Psychology*, 1932, *27*, 279-296.

League, Betty J., & Jackson, D. N. Conformity, veridicality, and self-esteem. Journal of Abnormal and Social Psychology, 1964, 68, 113-115.

London, P., & Lim, H. Yielding reason to social pressure: task complexity and expectation in conformity. Journal of Personality, 1964, 32, 75-89.

Luchins, A. S., & Luchins, Edith H. On conformity with true and false communications. Journal of Social Psychology, 1955, 42, 283-304.

Luchins, A. S., & Luchins, Edith H. On conformity with judgments of a majority or an authority. Journal of Social Psychology, 1961, 53, 303-316.

MacKinnon, D. W. What do we mean by talent and how do we test for it? The search for talent: college admissions, No. 7. New York: Coll. Ent. Exam. Board, 1959.

Marek, J. Information, perception, and social context. I. Simple level of perceptual response. Human Relations, 1963, 16, 209-231.

McDavid, J. W., & Sistrunk, F. Personality correlates of two kinds of conforming behavior. Journal of Personality, 1964, 32, 420-435.

Milgram, S. Nationality and conformity. Scientific American, 1961, 205(6), 45-51.

Milgram, S. Issues in the study of obedience: a reply to Baumrind. American Psychologist, 1964, 19, 848-852.

Miller, D. C., & Form, W. H. Industrial sociology. (2nd ed.) New York: Harper & Row, 1964.

Nichols, R. C. The parental attitudes of mothers of intelligent adolescents and the creativity of their children. Child Development, 1964, 35, 1041-1049.

Pemberton, W. A. Ability, values, and college achievement. Newark, Delaware: University of Delaware, 1963.

Pepinsky, Pauline N. A study of productive nonconformity. Gifted Child Quarterly, 1960, 4(4), 81-85.

Pepinsky, Pauline N. The social dialectic of productive nonconformity. Merrill-Palmer Quarterly of Behavior and Development, 1961, 7, 127-137.

Reitan, H. T., & Shaw, M. E. Group membership, sex-composition of the group, and conformity behavior. Journal of Social Psychology, 1964, 64, 45-51.

Roe, Anne. The psychology of occupations. New York: Wiley, 1956.

Roe, Anne. Personal problems and science. In C. W. Taylor (Ed.), The third University of Utah research conference on the identification of creative scientific talent. Salt Lake City: University of Utah Press, 1959. Pp. 202-212.

Rutherford, Jeanne M. Personality correlates of creativity. Unpublished doctoral dissertation, Vanderbilt University, 1960.

Sherif, M. An experimental approach to the study of attitudes. Sociometry, 1937, 1, 90-98.

Sherif, M., & Sherif, Carolyn W. Reference groups: explorations into conformity and deviation of adolescents. New York: Harper, 1964.

Siegel, Alberta E., & Siegel, S. Reference groups, membership groups, and attitude change. Journal of Abnormal and Social Psychology, 1957, 55, 360-364.

Singer, A., Jr. Certain aspects of personality and their relation to certain group modes, and constancy of friendship choices. Journal of Educational Research, 1951, 45, 33-42.

Spaulding, C. B. An introduction to industrial sociology. San Francisco: Chandler Publishing Co., 1961.

Starkweather, Elizabeth K., & Cowling, Frieda G. The measurement of conforming and nonconforming behavior in preschool children. Proceedings of Oklahoma Academy of Science, 1964, 44, 168-180.

Thibaut, J. W., & Strickland, L. Psychological set and social conformity. Journal of Personality, 1956, 25, 115-129.

Torrance, E. P. Explorations in creative thinking in the early school years: V. An experimental study of peer sanctions against highly creative children. Minneapolis: Bureau of Educational Research, University of Minnesota, 1959.

Torrance, E. P. Can grouping control social stress in creative activities? Elementary School Journal, 1961, 62, 139-145.

Torrance, E. P. Guiding creative talent. Englewood Cliffs, New Jersey: Prentice-Hall, 1962. (a)

Torrance, E. P. Cultural discontinuities and the development of originality of thinking. Exceptional Children, 1962, 29, 3-13. (b)

Tuddenham, R. D. The influence of a distorted group norm upon individual judgment. Journal of Psychology, 1958, 46, 227-241. (a)

Tuddenham, R. D. The influence of an avowedly distorted norm upon individual judgment. Journal of Psychology, 1958, 46, 329-338. (b)

Tuddenham, R. D. Correlates of yielding to a distorted group norm. Journal of Personality, 1959, 27, 272-284.

Tuddenham, R. D. The influence of a distorted group norm upon judgment of adults and children. Journal of Psychology, 1961, 52, 231-239. (a)

Tuddenham, R. D. The influence upon judgment of the apparent discrepancy between self and others. Journal of Social Psychology, 1961, 53, 69-79. (b)

Tuddenham, R. D., & McBride, P. D. The yielding experiment from the subject's point of view. Journal of Personality, 1959, 27, 259-271.

Tuddenham, R. D., Macbride, P., & Zahn, V. The influence of the sex composition of the group upon yielding to a distorted norm. Journal of Psychology, 1958, 46, 243-251.

U. S. Department of Labor. Manpower report of the President and a report on manpower requirements, resources, utilization, and training. Washington: Author, 1963.

Walker, E. L., & Heyns, R. W. An anatomy for conformity. Englewood Cliffs, New Jersey: Prentice-Hall, 1962.

Walters, R. H., Marshall, W. E., & Shooter, J. R. Anxiety, isolation, and susceptibility to social influence. Journal of Personality, 1960, 28, 518-529.

Wertheimer, Rita R. Consistency of sociometric status position in male and female high school students. Journal of Educational Psychology, 1957, 48, 385-390.

Wilson, R. S. Personality patterns, source attractiveness, and conformity. Journal of Personality, 1960, 28, 186-199.

Winer, B. J. Statistical principles in experimental design. New York: McGraw-Hill, 1962.

Yamamoto, K. Development of ability to ask questions under specific testing conditions. Journal of Genetic Psychology, 1962, 101, 83-90.

Yamamoto, K. Experimental scoring manuals for Minnesota tests of creative thinking and writing. Kent, Ohio: Bureau of Educational Research, Kent State University, 1964.

APPENDICES

Appendix A

Measures of Creative Thinking

(For Research Purposes Only)

Date:______________

MINNESOTA TESTS OF CREATIVE THINKING
(Form K-V-B)

Name:______________________________ Boy Girl Age:______ Grade: __________

School: __________________________ Teacher:________________________________

How many brothers and sisters do you have? _____Brothers and _____Sisters

What kind of work does your father do? ____________________________________

What kind of work does your mother do? ____________________________________

What kind of work are you interested in doing when you grow up? ___________

____

* * * * * * * * * * * * * * * * * * * *

INSTRUCTIONS: In this booklet, you find several interesting things for you to do. All of these will give you a chance to use your imagination and to think of new ideas. There are no "right" or "wrong" answers in the usual sense. We want you to think of as many ideas as you can and also as unusual, interesting, and clever ideas as you can--ideas no one else in your class will think of.

You will be given a time limit on each of these tasks, so don't waste time. Work fast. If you run out of ideas before time is called, wait until you are told to do so before you turn to the next page.

* * * * * * * * * * * * * * * * * * * *

Part I	Fl	Ad	Fx	O	E	S-T
Part II	____	____	____	____	____	____

* * * * * * * * * * * * * * * * * * * *

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Part I: Ask-and-Guess Test

TASK 1. ASK. The first three tasks will be based on a picture which will be projected on the screen. The first task will give you a chance to show how good you are at asking questions. In the spaces below write down all of the questions you can think of about the things you see in the picture. Ask those questions you would need to know to understand what is happening. Do not ask questions which can be answered just by looking at the picture. (5 minutes)

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________
11. ______________________________
12. ______________________________
13. ______________________________
14. ______________________________
15. ______________________________
16. ______________________________
17. ______________________________
18. ______________________________
19. ______________________________
20. ______________________________
21. ______________________________
22. ______________________________
23. ______________________________
24. ______________________________
25. ______________________________

TASK 2. GUESS CAUSES. In the spaces below, list as many possible things as you can which might have caused the action shown in the picture. You may use things that might have happened just before the event in the picture, or something that happened a long time ago that had an influence on the present event. Make as many guesses as you can. Don't be afraid to guess. (5 minutes)

1. ______
2. ______
3. ______
4. ______
5. ______
6. ______
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______
24. ______
25. ______
26. ______
27. ______

TASK 3. GUESS CONSEQUENCES. In the spaces below, list as many possibilities as you can of what might happen as a result of what is happening in the picture. You may use things that might happen right afterwards or things that might happen as a result long afterwards in the future. Make as many guesses as you can. Don't be afraid to guess. (5 minutes)

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________
6. ____________________
7. ____________________
8. ____________________
9. ____________________
10. ____________________
11. ____________________
12. ____________________
13. ____________________
14. ____________________
15. ____________________
16. ____________________
17. ____________________
18. ____________________
19. ____________________
20. ____________________
21. ____________________
22. ____________________
23. ____________________
24. ____________________
25. ____________________
26. ____________________
27. ____________________

Part II: Test of Imagination

TASK 4. PRODUCT IMPROVEMENT. List below the cleverest, most interesting, and most unusual ways you can think of for changing the toy dog you will be shown so that children would have more fun playing with it. (8 minutes)

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____
11. ____
12. ____
13. ____
14. ____
15. ____
16. ____
17. ____
18. ____
19. ____
20. ____
21. ____
22. ____
23. ____
24. ____
25. ____
26. ____
27. ____

TASK 5. UNUSUAL USES. List below the cleverest, most interesting, and most unusual uses you can think of for this toy dog other than as a plaything. (5 minutes)

1. ____

2. ____

3. ____

4. ____

5. ____

6. ____

7. ____

8. ____

9. ____

10. ____

11. ____

12. ____

13. ____

14. ____

15. ____

16. ____

17. ____

18. ____

19. ____

20. ____

21. ____

22. ____

23. ____

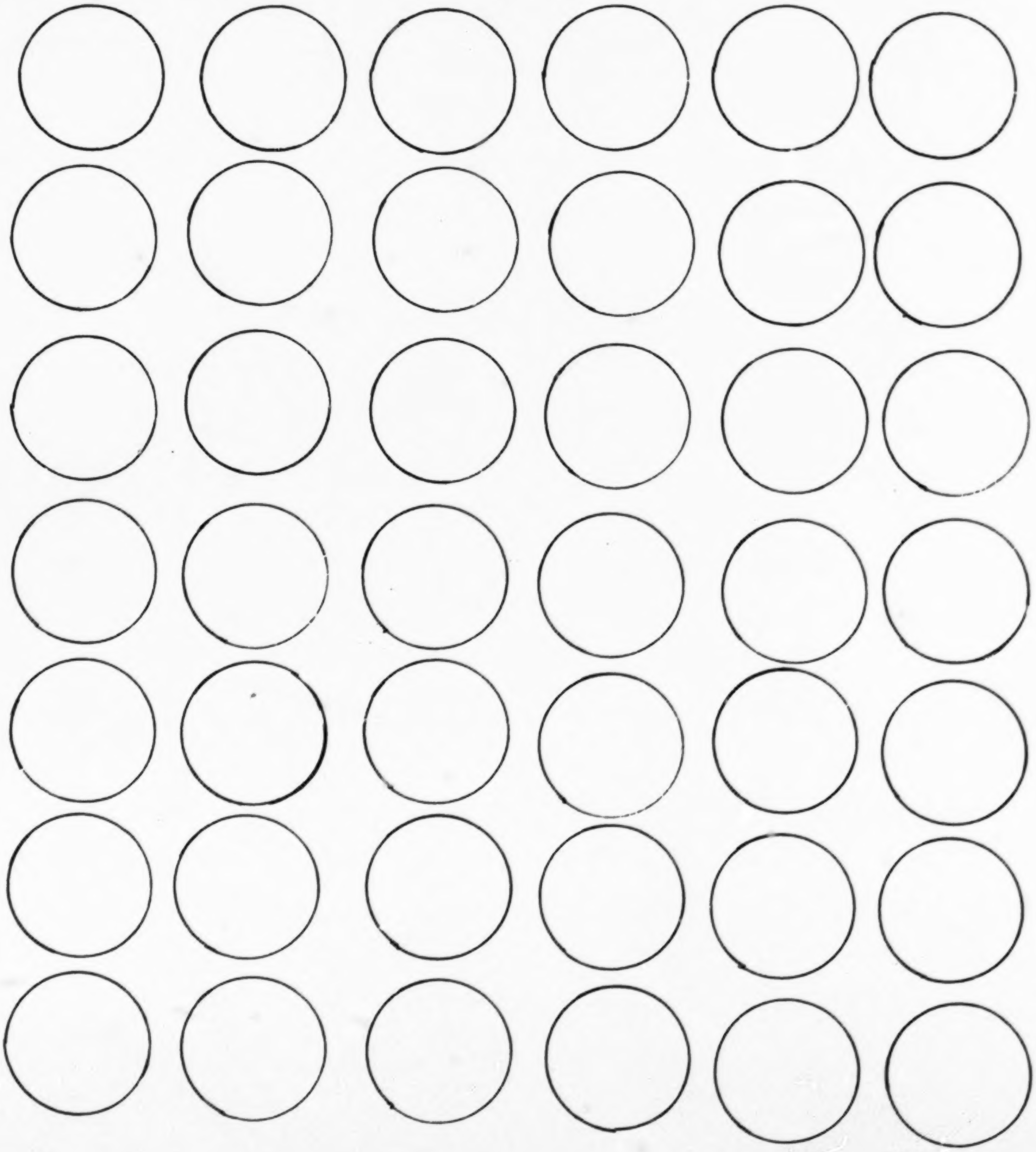
24. ____

25. ____

26. ____

27. ____

TASK 6. Circles. See how many objects you can make from the circles below. A circle should be the main part of whatever you make. With pencil or crayon add lines to the circle to complete your picture. Your lines can be inside the circle, outside the circle, or both inside and outside the circle. Try to think of things that no one else in the class will think of. Make as many things as you can and put as many ideas as you can in each one. Add names or titles to tell what the object is. (10 minutes)



Appendix B

Teacher Nomination Form

(For research purposes only)

WHO DOES IT? (Teacher Form)

Name of Teacher ______________________ Grade ______ Date __________

School ______________________ Number of children in your class _____

INSTRUCTIONS: In answering the questions below, use the names of pupils in your class in this school. One name may be repeated in answering different questions. Read from 1A to 1B, then to 2A and 2B, and so on.

1A. Who in this class comes up with the most ideas?

(1) ____________________

(2) ____________________

(3) ____________________

1B. Who, in this regard, fares least well?

(1) ____________________

(2) ____________________

(3) ____________________

2A. Who has the most original or unusual ideas?

(1) ____________________

(2) ____________________

(3) ____________________

2B. Who, in this regard, fares least well?

(1) ____________________

(2) ____________________

(3) ____________________

3A. Who shows the most flexibility in thinking up new ideas in the face of a new situation or of a new difficult problem?

(1) ____________________

(2) ____________________

(3) ____________________

3B. Who, in this regard, fares least well?

(1) ____________________

(2) ____________________

(3) ____________________

4A. Who is best at thinking of all the details involved and all the consequences anticipated in working out a new idea?

(1) ____________________

(2) ____________________

(3) ____________________

4B. Who, in this regard, fares least well?

(1) ____________________

(2) ____________________

(3) ____________________

5A. Whose ideas are most relevant to the problem presented and the questions asked?

(1) ____________________

(2) ____________________

(3) ____________________

5B. Who, in this regard, fares least well?

(1) ____________________

(2) ____________________

(3) ____________________

6A. Who is the most popular pupil in your class?

(1) ____________________

(2) ____________________

(3) ____________________

6B. Who is the least popular?

(1) ____________________

(2) ____________________

(3) ____________________

Appendix C

Pupil Nomination Form

(Names of teacher, school, and pupils in the
class list are all fictitious)

WHO ARE THEY?

DATE ____________

YOUR NAME ______________________________ BOY GIRL GRADE ____________

TEACHER'S NAME __________________________ SCHOOL ____________________

INSTRUCTIONS:

On the next page you will find a list of the names of the boys and girls in your class. you are to pick ten (10) classmates with whom you would like to play. Pretend that you are the captain of a team and you are choosing up sides to play a game. Who would you choose first? Find his name on the list and put a (1) in front of it. Now, who would you choose next? Number his name (2). Keep going until you have chosen the ten people with whom you would like to play. When you have finished, you should have ten (10) names numbered.

Mrs. Grant
Washington School

Anderson, David

Atwater, Gregory

Bankhart, Scott

Bennett, Gary

Dugan, James

Duncan, Karl

Farnsworth, Mark

Fox, Donald

Griffith, Jeffrey

King, Lucas

Newman, John

Peck, Robert

Preston, Robert

Richter, Richard

Benson, Carol

Edwards, Caroline

Jackson, Cynthia

Kenton, Kathleen

Luria, Marjorie

Mearns, Rita

Morrison, Joyce

Orne, Marianne

Polansky, Michele

Swenson, Martha

Walker, Cheryl

West, Christina

Wittenauer, Paula

Yost, Debra

WHO ARE THEY?

DATE ______________

YOUR NAME ____________________ BOY GIRL GRADE ______________

TEACHERS's NAME ____________________ SCHOOL ____________________

INSTRUCTIONS:

On the next page you will find another list of the names of the boys and girls in your class. This time you are to choose ten (10) classmates that you would not like to play with. If you were the captain of a team and were choosing up sides, which boy or girl would you choose last? Find his name and put a (1) in front of it. Who would be the next-to-the-last classmate you would choose? Number his name (2). Keep going until you have picked ten classmates with whom you would not like to play. When you have finished, you should have ten (10) names numbered.

Mrs. Grant
Washington School

Anderson, David

Atwater, Gregory

Bankhart, Scott

Bennett, Gary

Dugan, James

Duncan, Karl

Farnsworth, Mark

Fox, Donald

Griffith, Jeffrey

King, Lucas

Newman, John

Peck, Robert

Preston, Robert

Richter, Richard

Benson, Carol

Edwards, Caroline

Jackson, Cynthia

Kenton, Kathleen

Luria, Marjorie

Mearns, Rita

Morrison, Joyce

Orne, Marianne

Polansky, Michele

Swenson, Martha

Walker, Cheryl

West, Christina

Wittenauer, Paula

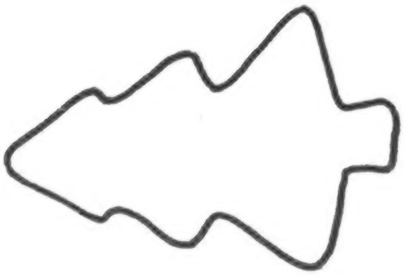
Yost, Debra

Appendix D

Perception Tasks and Experimental Instructions

Practice A (Recognition)

Look carefully at the slide which you see on the screen. On this slide you see one drawing. Look at it carefully. (Allow 20 seconds.)

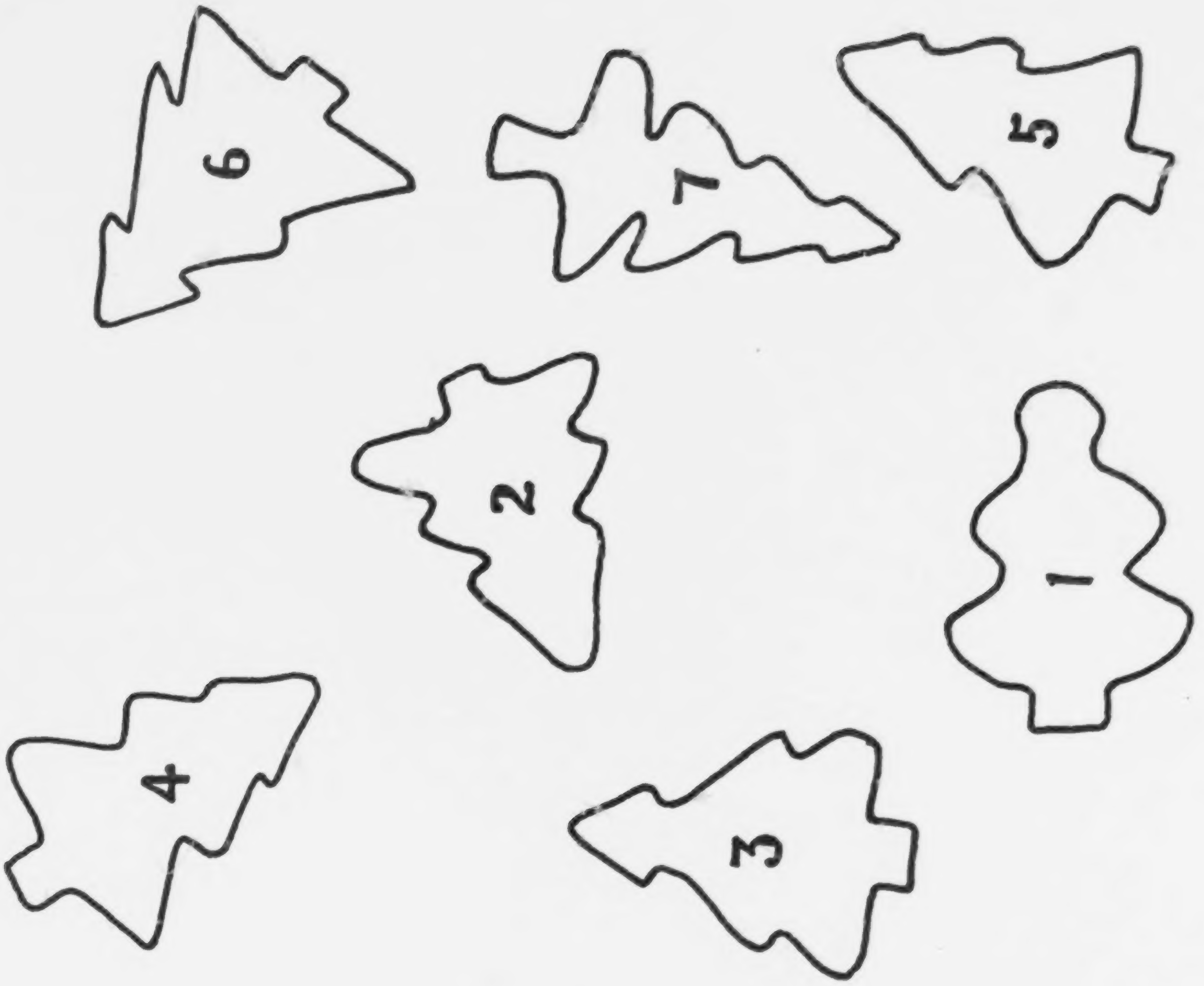


Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is just the same. Each choice is numbered one through seven. On the panel in front of you, you will also find numbers one through seven. Above each number is a red button which you will push if you think that particular number is the drawing that is exactly like the one you just saw. There is only one correct answer. But before you can make your choice, by pushing the button, you must wait for the red light at the end of this row of buttons to come on. Like this. When this light comes on you may make your choice. There are also four rows of blue bulbs on your panel, and while you are waiting for this red light to come on, you will notice that some of these blue lights come on. Like this. These blue lights tell you that your classmates are making their choices and you can see which choices they have made by simply checking the numbers below the blue lights.

Now which one of these drawings do you think is exactly like the one you just saw? Make your choice and watch for your red light. When the red light comes on, push the button you have chosen. (Subjects make choices.) As soon as you do this a green light comes on and shows you the choice you have made. Remember, blue lights show your classmates' choices and green lights show your own choice.

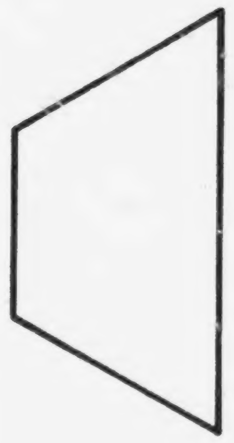
You can make only one choice. And there is no way to change your answer once you have pushed the button.

We will do one more practice slide before we begin.



Practice B (Puzzle B)

On the next slide you will be shown a puzzle that is put together. Look at it carefully. (Allow 20 seconds.)

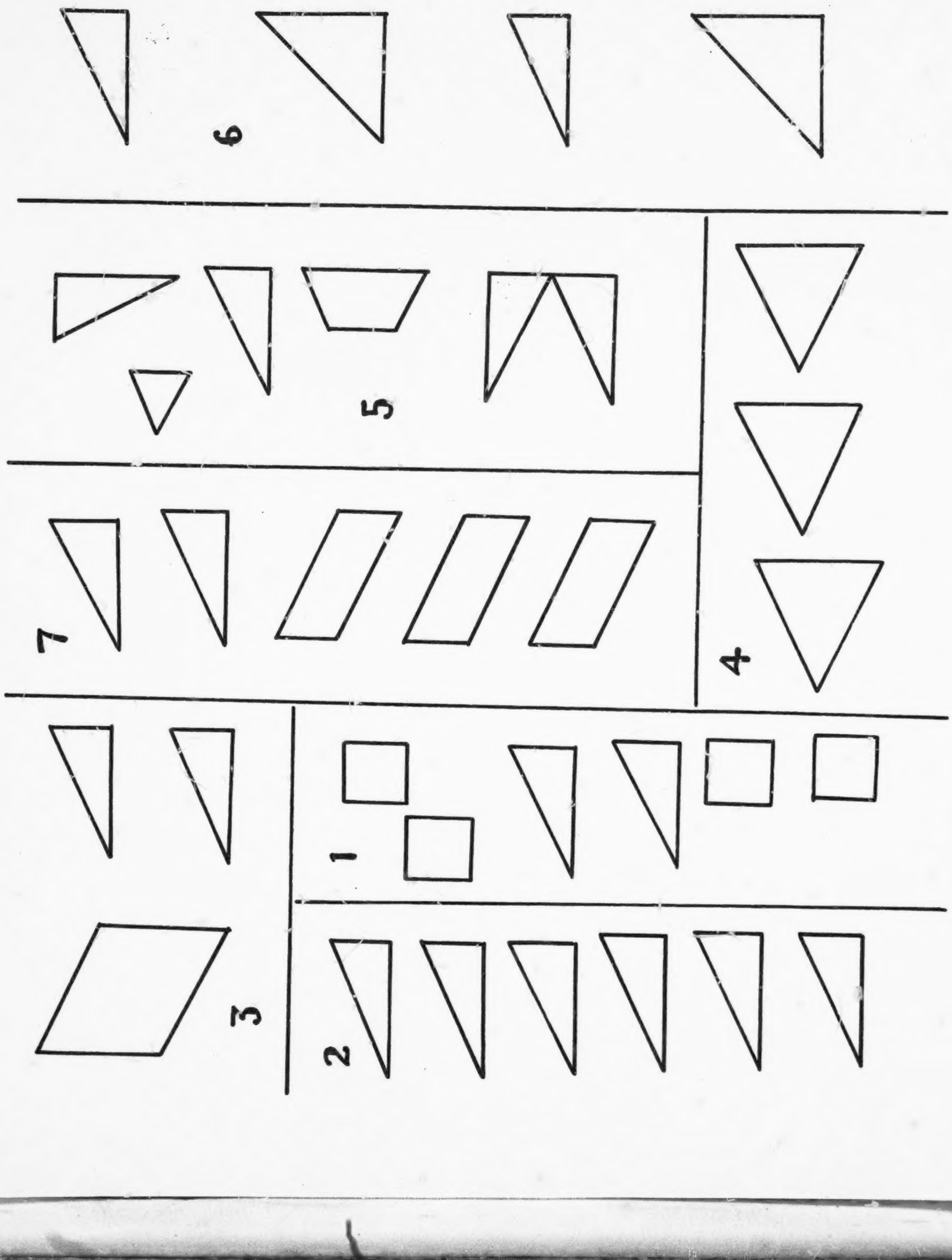


Now you see seven sets of pieces. These pieces, if they are put together correctly should look like the puzzle you saw. Only one set of pieces will not fit together to make the puzzle. The other six sets will. Find the set of pieces that does not fit together to make up the puzzle you just saw. Decide which one will not make the puzzle, wait for the red light, and then make your choice by pushing the button that has the number of your choice below it. (Subjects make choices.)

Each time listen carefully to the instructions. They will tell you what to do when each slide is presented.

Remember, the blue lights show the choices of your classmates and the green lights show your choices.

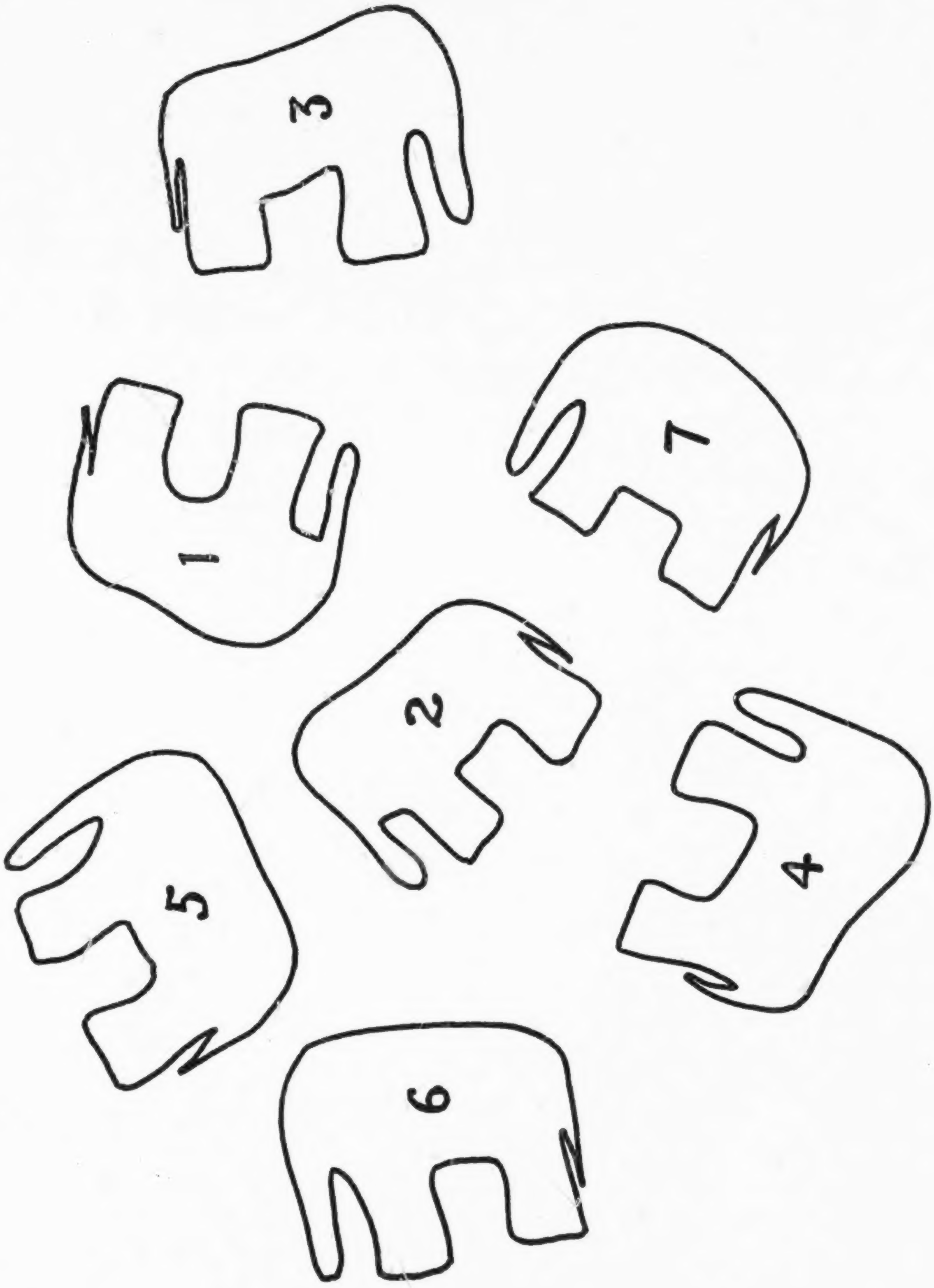
We are now ready to begin.



Task No. 1 (Recognition)

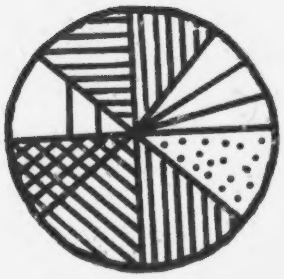
On the next slide you will see one drawing. Look at it carefully. (Allow 20 seconds.)

Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is _just_ the same. Choose the drawing that is exactly like the one you just saw by pushing the button with the number of your choice. Remember, you cannot push the button until the red light comes on.



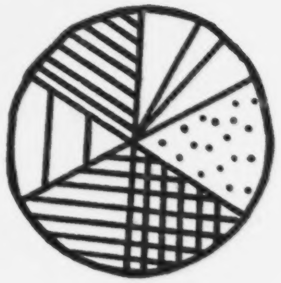
Task No. 2 (Recognition)

On this slide you again see one drawing. Look at it carefully. (Allow 20 seconds.)



Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is _just_ the same. Choose the drawing that is exactly like the one you just saw by pushing one of the buttons. Remember, you cannot push the button until the red light comes on.

6



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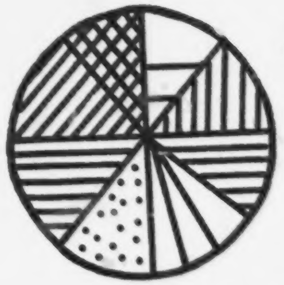
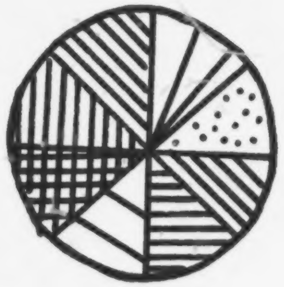


5



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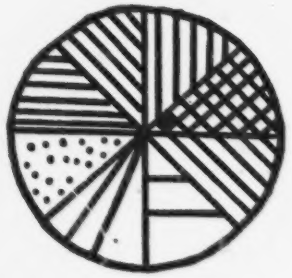
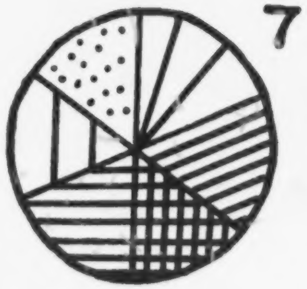
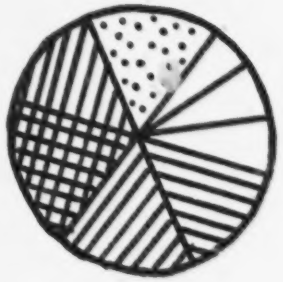


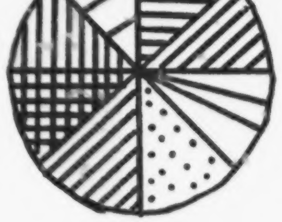
7



2

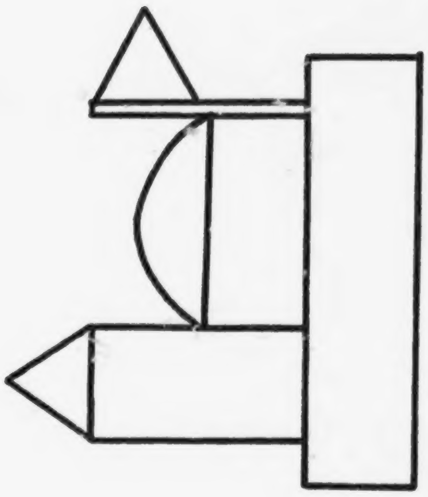


1

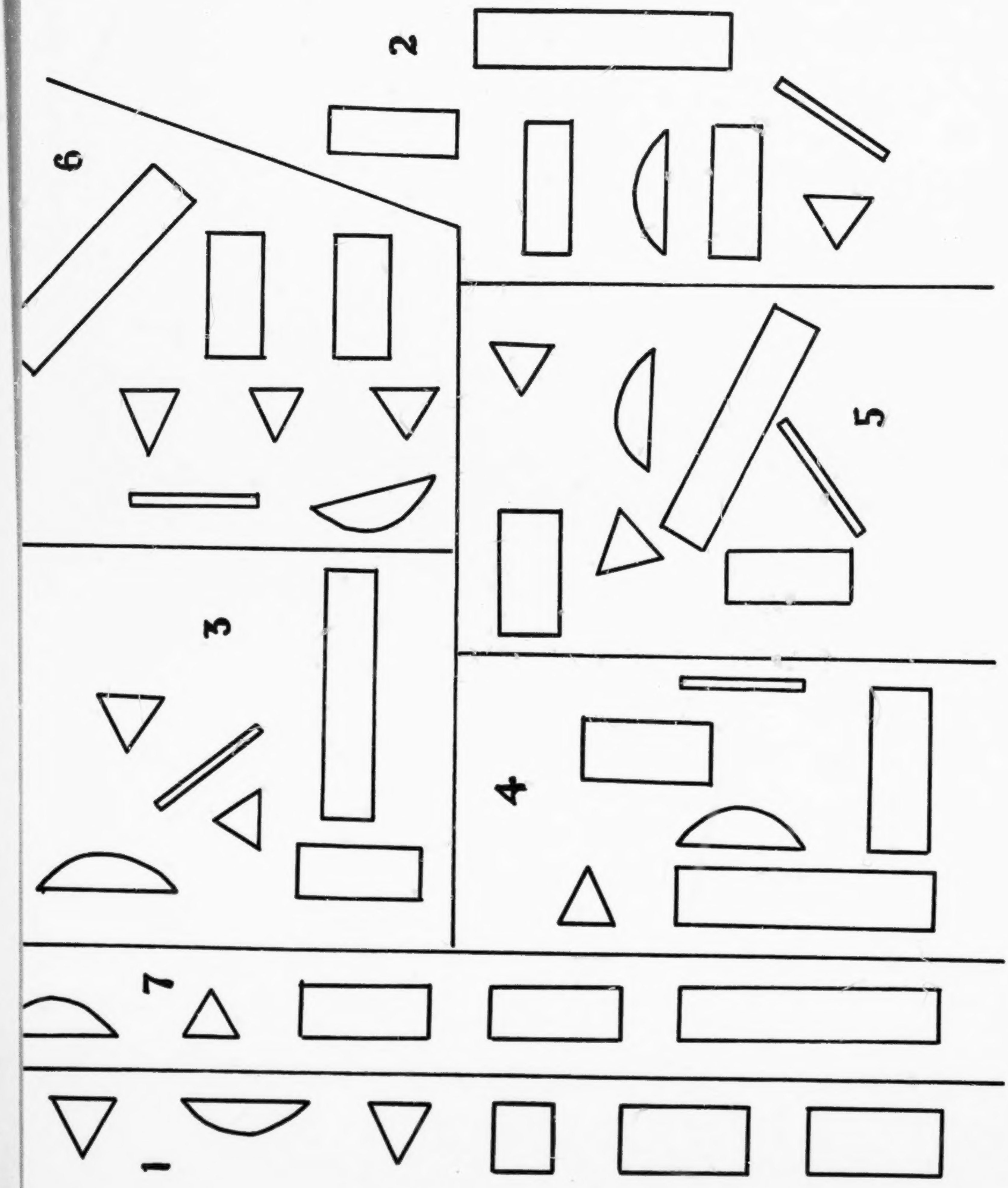


Task No. 3 (Puzzle A)

The next two slides are puzzle tests. Look carefully at this first slide to see what the puzzle looks like when it is put together. (Allow 20 seconds.)

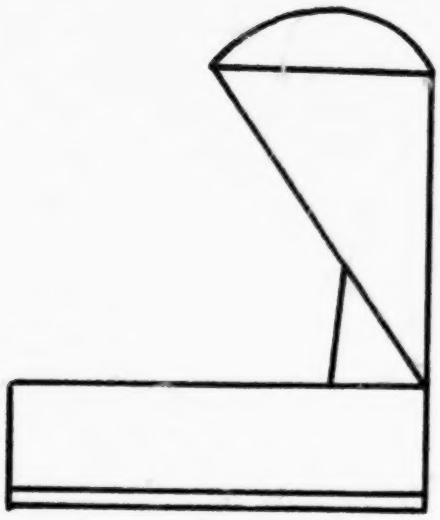


On the next slide we see seven sets of pieces. Only one set of pieces will fit together to make the puzzle you just saw. Find the correct set of pieces and wait for the red light. You must choose only one set. If you are not sure, choose the set you think is best. Choose the set of pieces that will fit together to make the puzzel. Think carefully before pushing the button, for once you have pushed it you cannot change your answer.

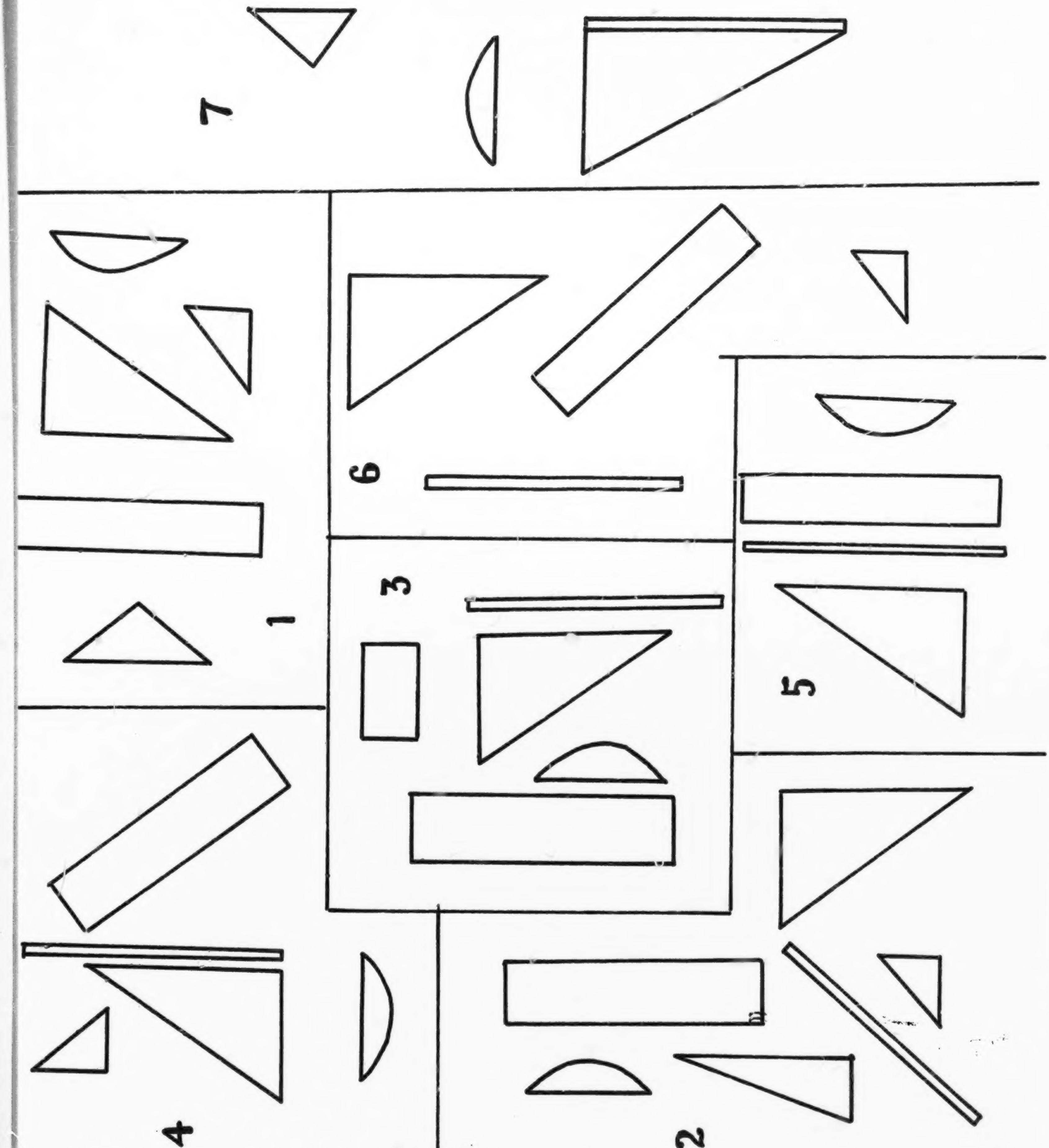


Task No. 4 (Puzzle A)

On this slide you again see a puzzle that is put together. Look at it carefully. (Allow 20 seconds.)

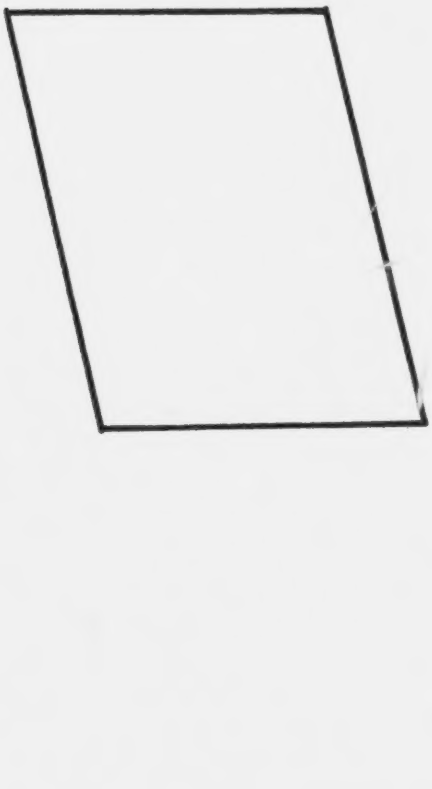


Now you see seven sets of pieces. Only one set of pieces will fit together to make the puzzle you just saw. Find the set of pieces that will make the puzzle and wait for the red light.



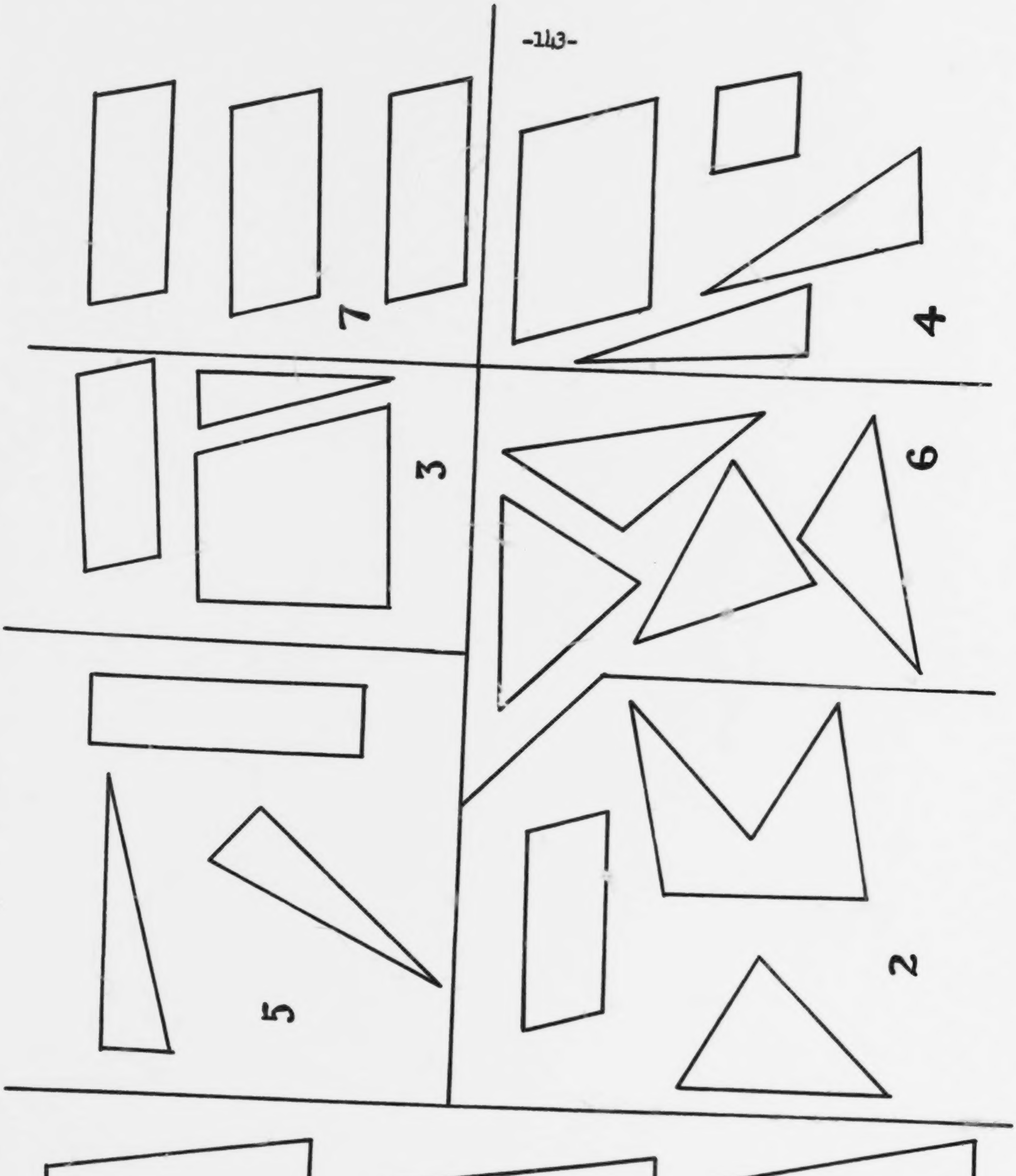
Task No. 5 (Puzzle B)

On the next slide you will again be shown a puzzle that is put together. Look at it carefully. (Allow 20 seconds.)



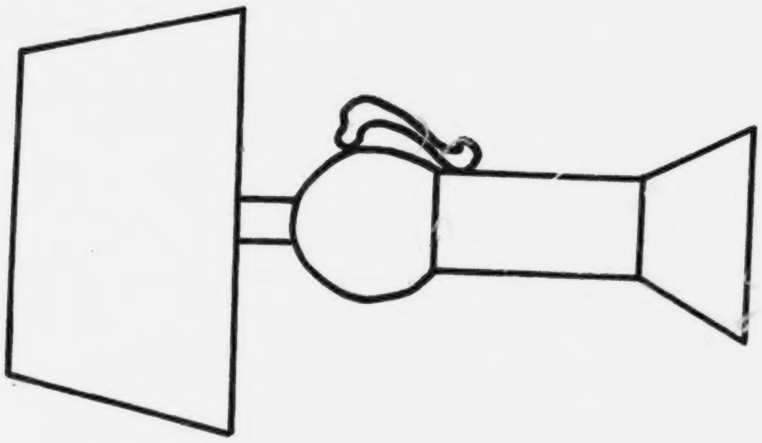
Now you can see seven sets of pieces. These pieces, if they are put together correctly, should look like the puzzle you saw. This time, only *one* set of pieces will *not* fit together to make the puzzle, the other six sets *will*.

Find the set of pieces that does *not* fit together to make up the puzzle you just saw. Wait for the red light, and then make your choice by pushing the button which has the number of your choice below it.

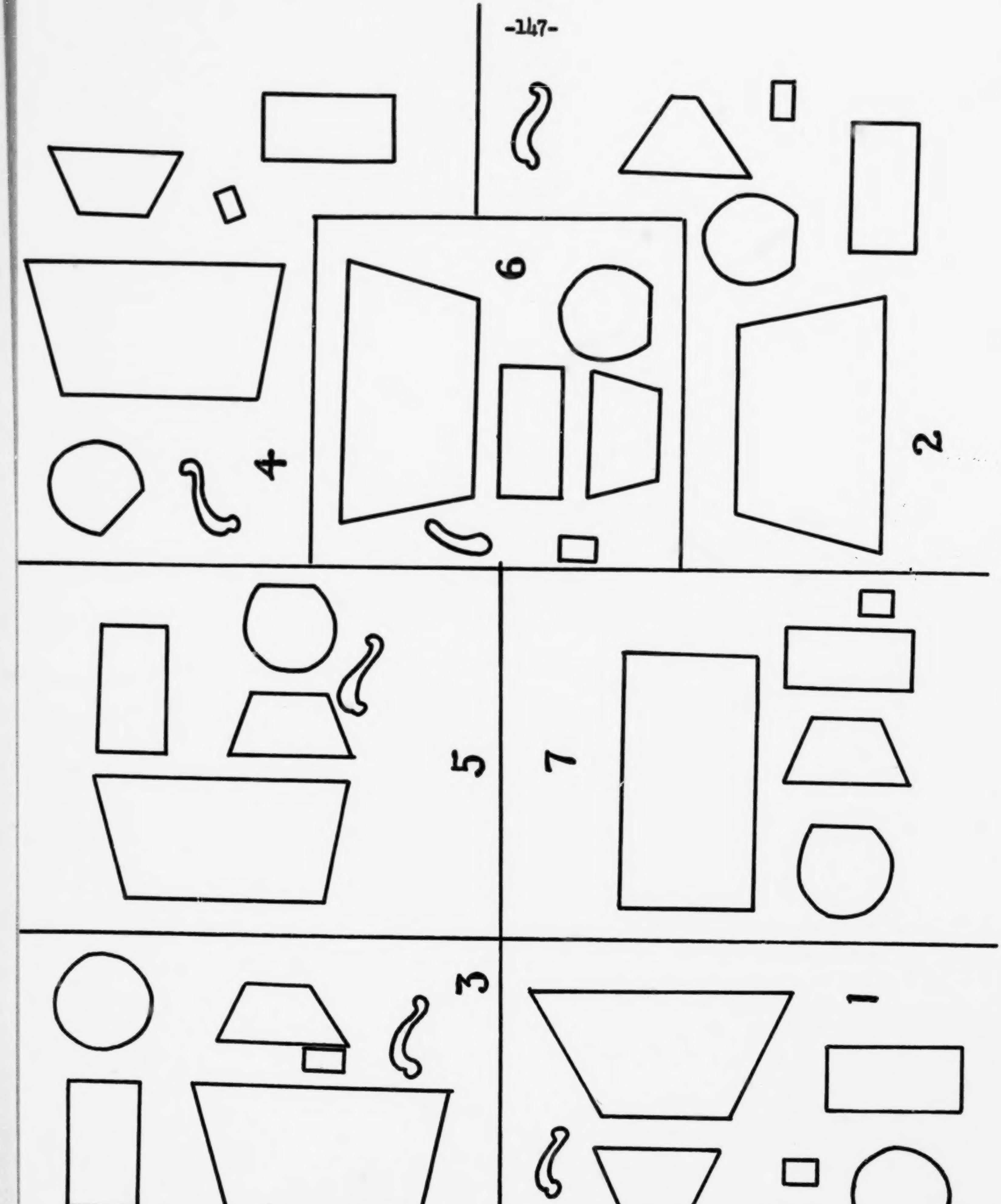


Task No. 6 (Puzzle A)

The next slide shows you another puzzle. Look carefully at this slide to see what the puzzle looks like when it is put together. (Allow 20 seconds.)

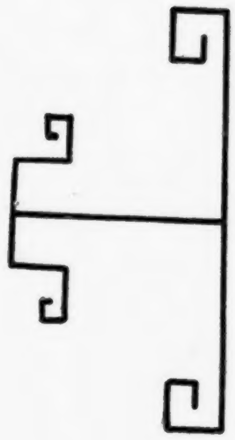


Now you see seven sets of pieces. Only one set of pieces will fit together to make the puzzle you just saw. Find the correct set of pieces and wait for the red light before pushing the button. You must choose only one set. If you are not sure, choose the set you think is best.

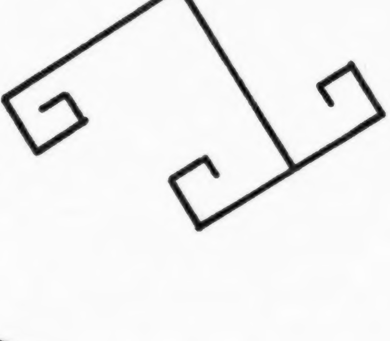


Task No. 7 (Recognition)

On the next slide you will see one drawing. Look at it carefully. (Allow 20 seconds.)



Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is _just_ the same. Choose the drawing that is exactly like the one you just saw by pushing the button with the number of your choice. Remember, you cannot push the button until the red light comes on.



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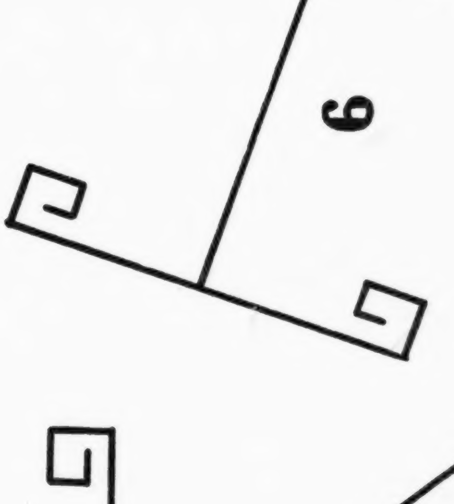

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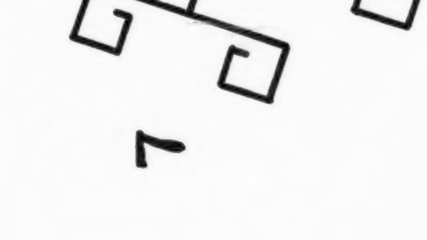

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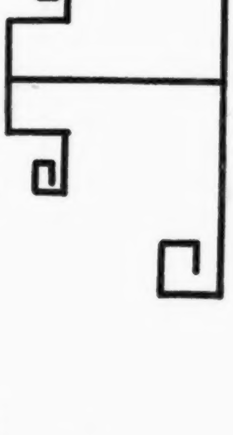

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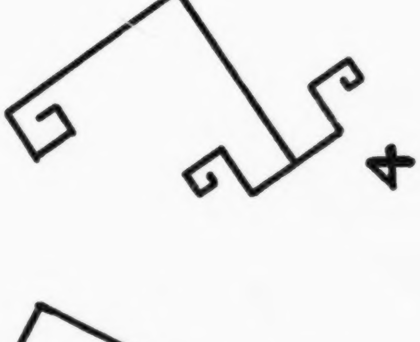
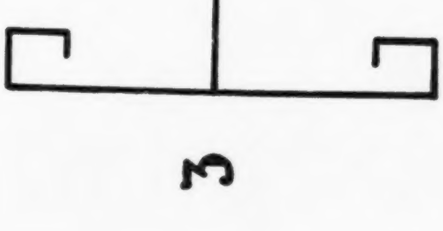


4



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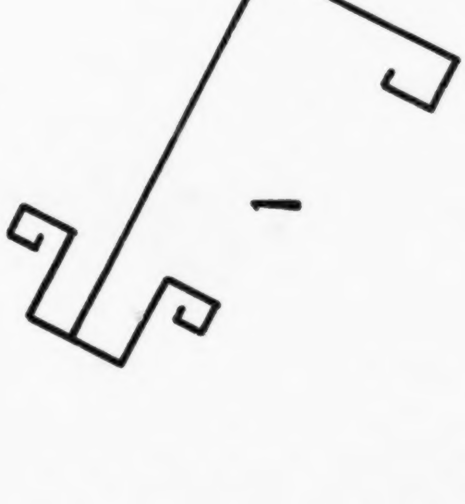
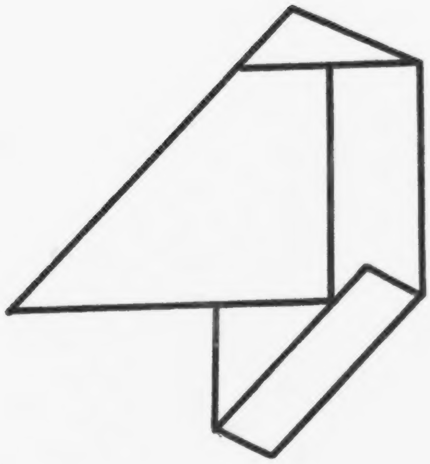


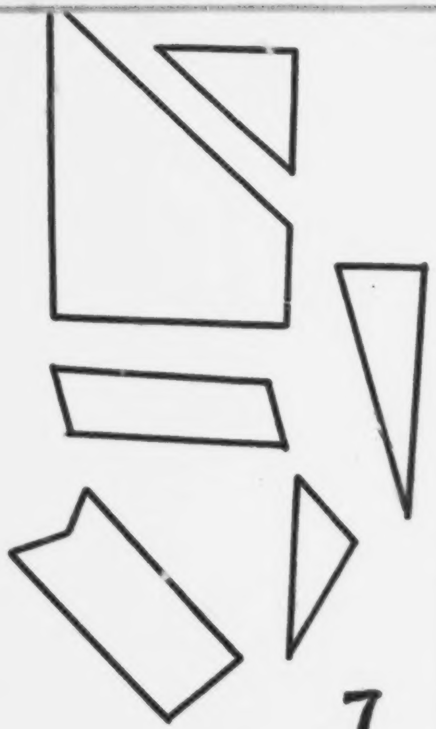
1

Task No. 8 (Puzzle A)

The next slide shows you another puzzle. Look carefully at this slide to see what the puzzle looks like when it is put together. (Allow 20 seconds.)



Now you see seven sets of pieces. Only one set of pieces *will* fit together to make the puzzle you just saw. Find the correct set of pieces and wait for the red light. You must choose only one set. If you are not sure, choose the set you think is best.



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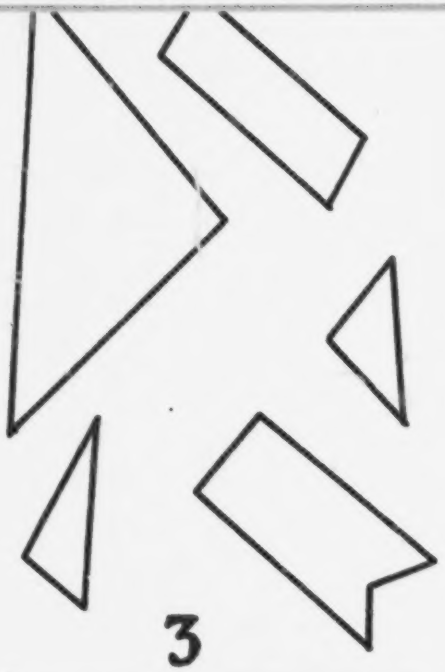

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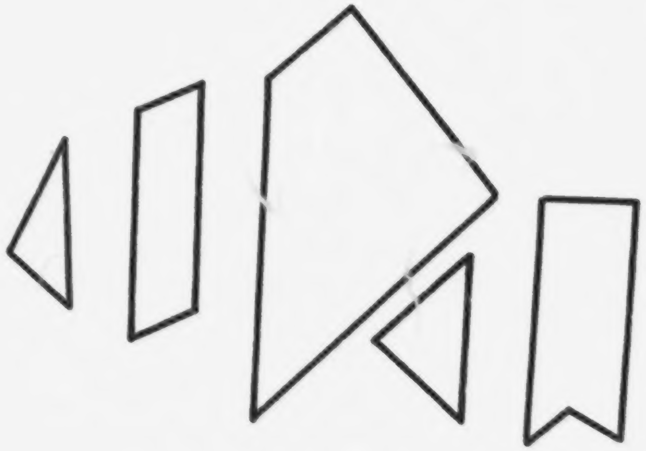

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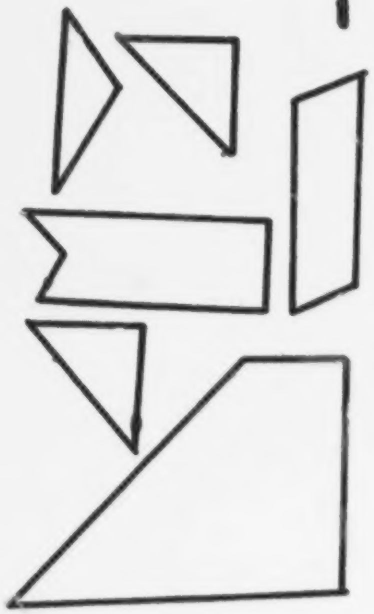

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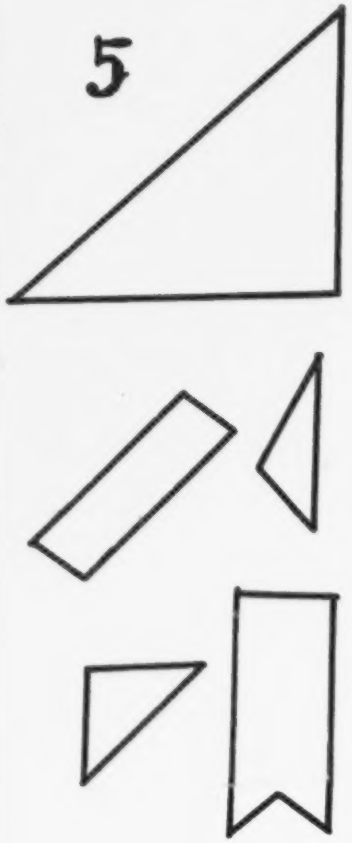

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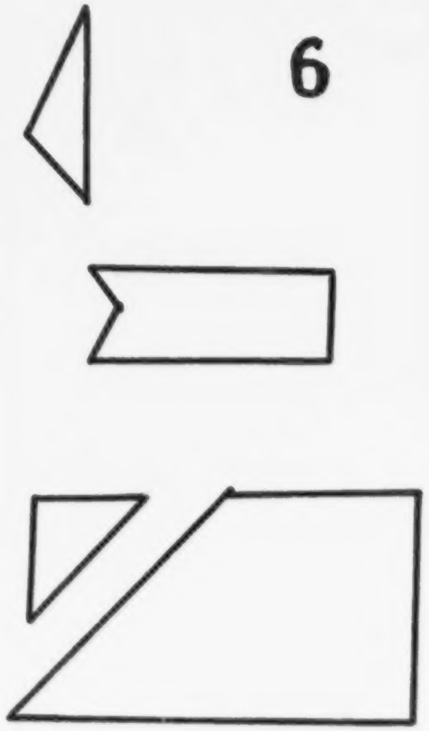

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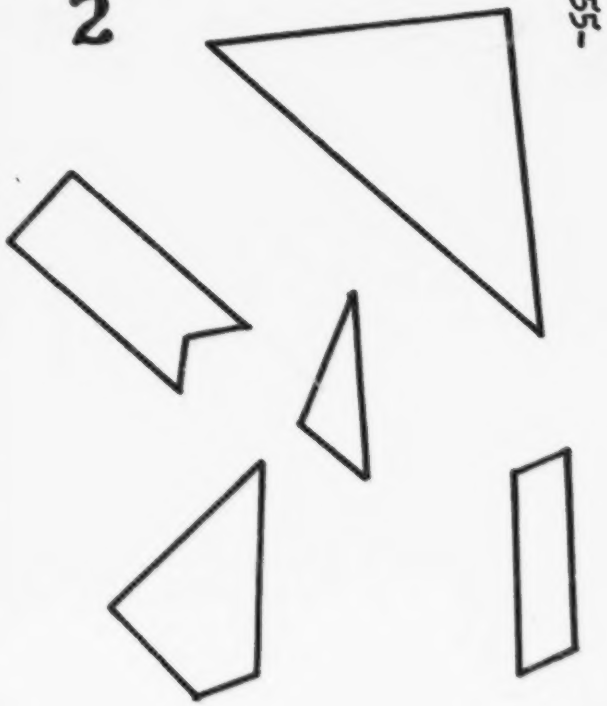
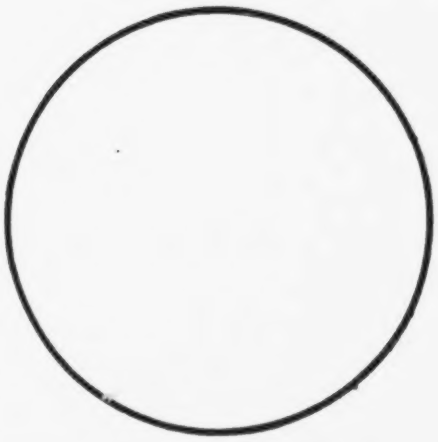


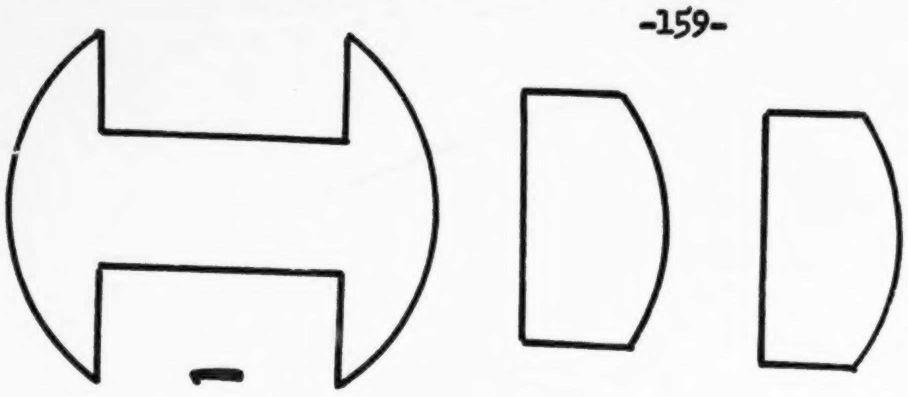
2

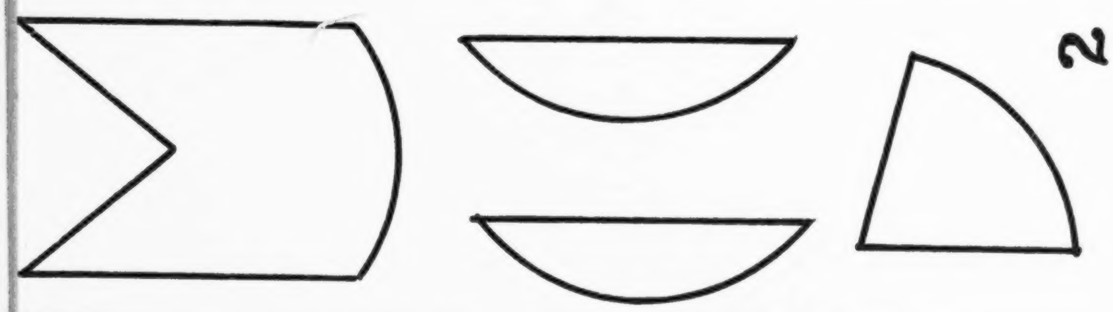
Task No. 9 (Puzzle B)

The next two slides are again puzzle tests. Look carefully at the first puzzle so that you may see how it looks when it is put together. (Allow 20 seconds.)



Now you see seven sets of pieces. These pieces, if put together correctly, should look like the puzzle you saw. Only one set of pieces will not fit together to make the puzzle, the six sets will. Find the set of pieces that does not fit together to make up the puzzle you just saw. Decide on your answer, wait for the red light, and then make your choice by pushing the button.


1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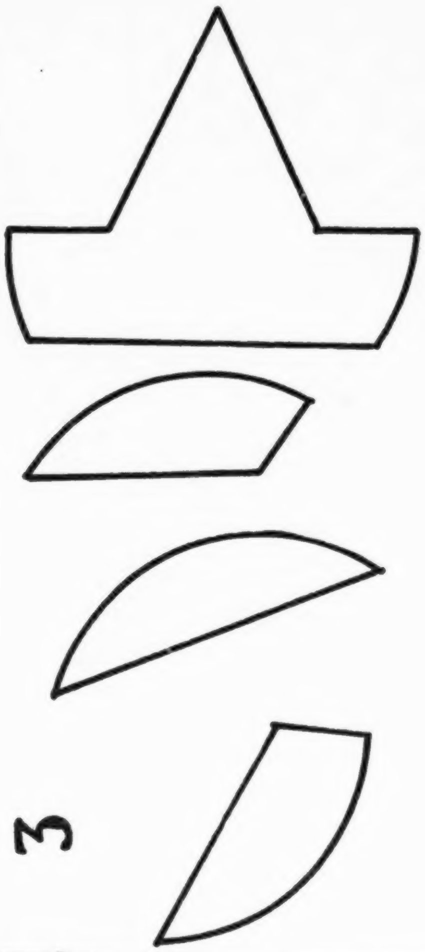
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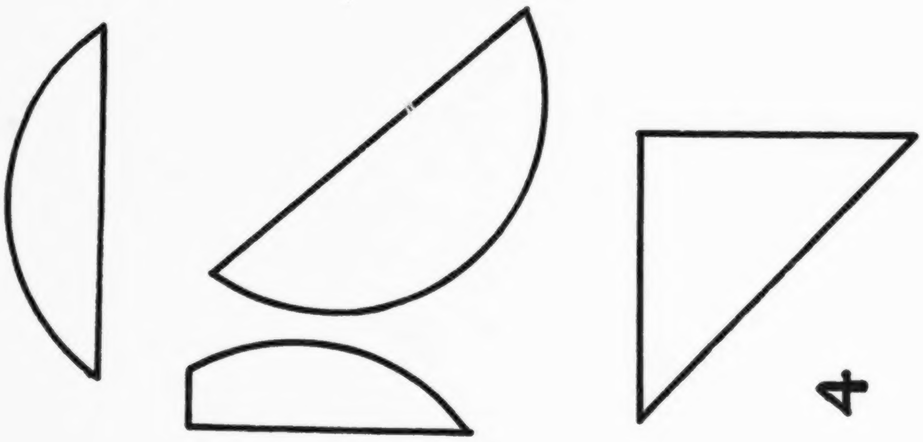
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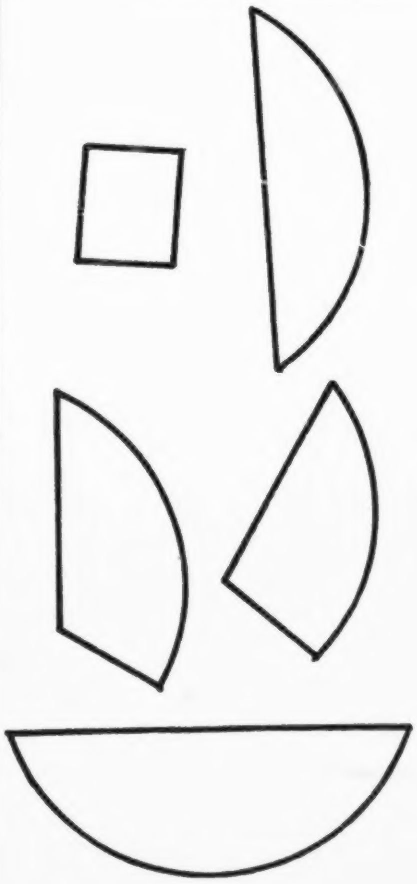
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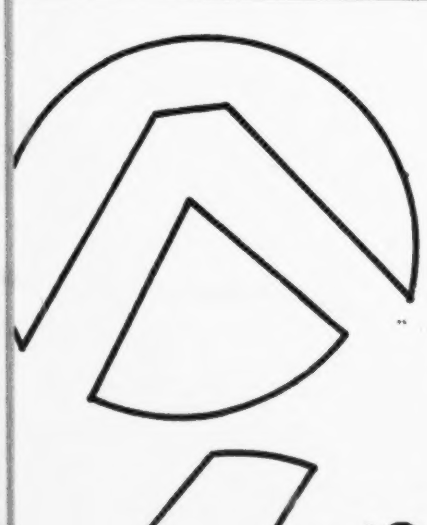
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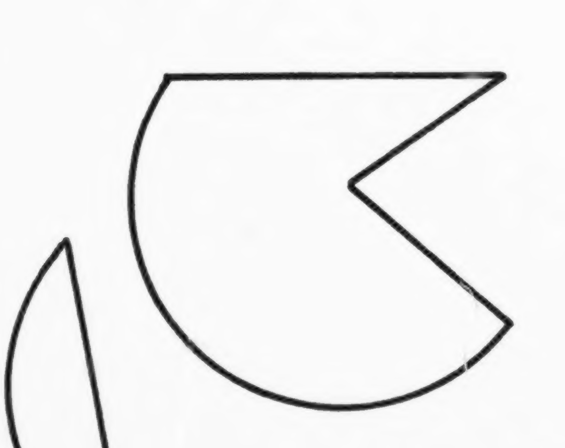
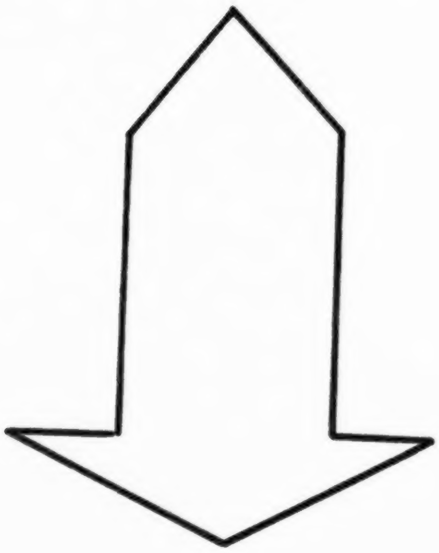
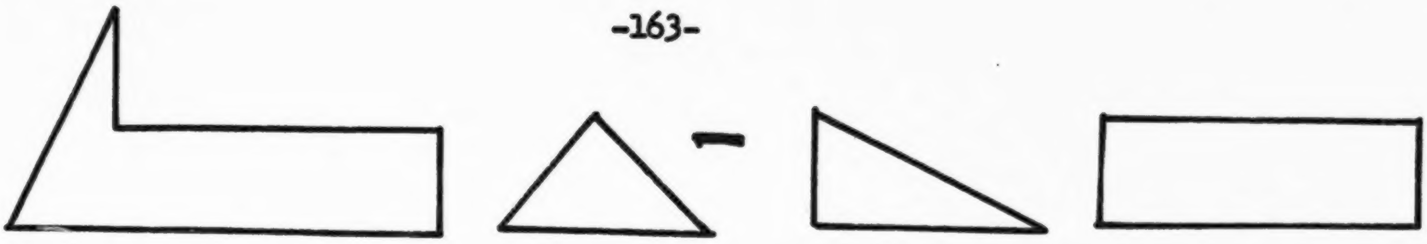

7

Task No. 10 (Puzzle B)

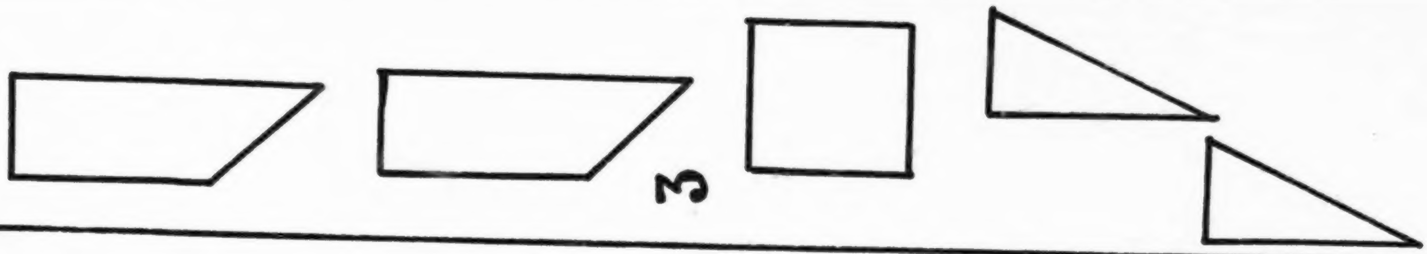
On the next slide you again see a puzzle. Look at it carefully. (Allow 20 seconds.)



Now you see seven sets of pieces. These pieces, if put together correctly, should look like the puzzle you just saw. Only one set will _not_ fit together to make the puzzle. Find the set of pieces that does _not_ fit together to make the puzzle you just saw, wait for the red light, and then make your choice by pushing the button.



1



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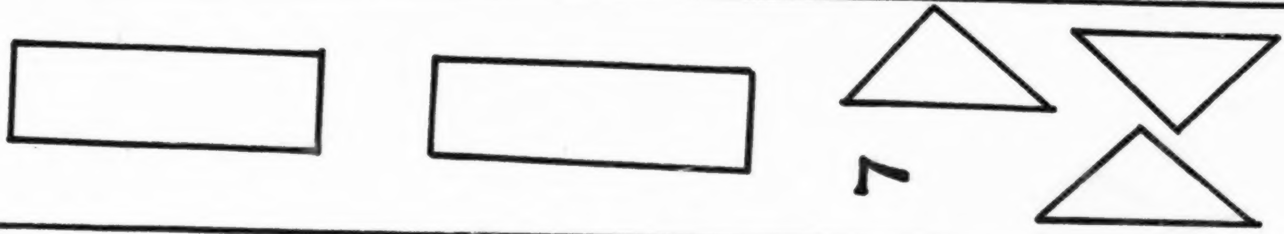
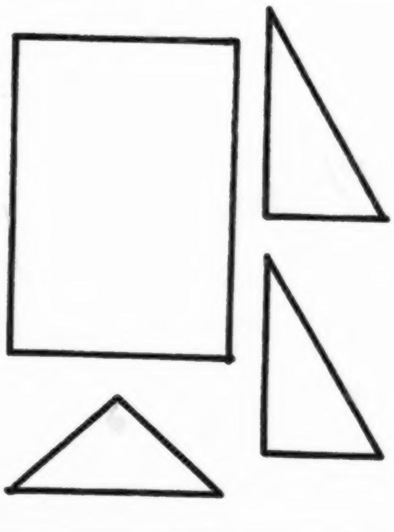
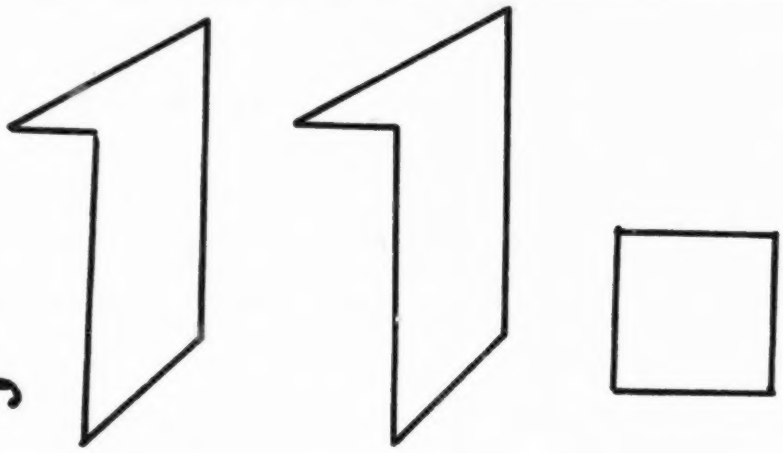


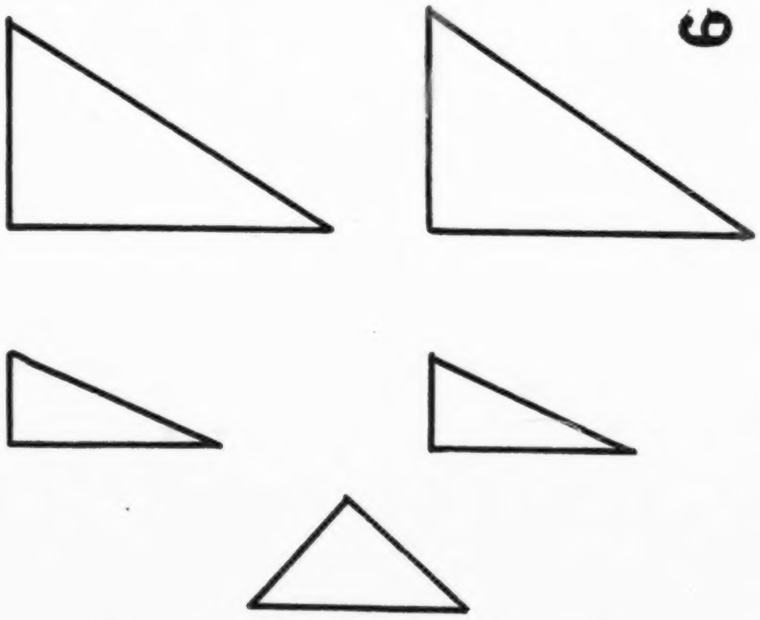
7



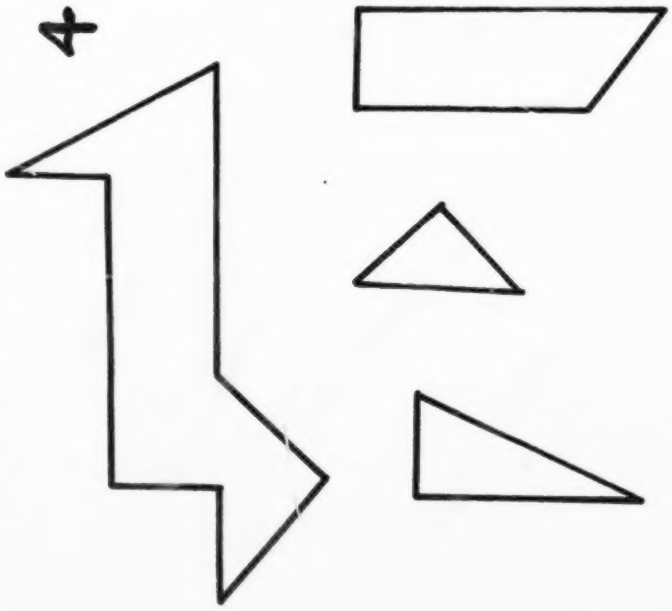
2



5



6



4

Appendix E

Control Instructions for Perception Tasks

Practice A (Recognition)

Look carefully at the slide which you see projected on the screen. On this slide you see one drawing. Look at it carefully. (20 seconds)

Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is just the same. Each choice is numbered one through seven. On the panel in front of you, you will also find numbers one through seven. Above each number is a red button which you will push if you think that particular number is the drawing that is exactly like the one you just saw. There is only one correct answer. But before you can make your choice, by pushing the button, you must wait for the red light at the end of this row of buttons to come on. Like this. When this light comes on, you may make your choice.

Now which one of these drawings do you think is exactly like the one you just saw? Make your choice and watch for the red light. When the red light comes on, push the button you have chosen. (Subjects make choices.) As soon as you do this a green light comes on to show you the choice you have made. You can make only one choice. And there is no way to change your answer once you have pushed the button.

We will do one more practice slide before we begin.

Practice B (Puzzle B)

On the next slide you will be shown a puzzle that is put together. Look at it carefully. (20 seconds)

Now you see seven sets of pieces. These pieces, if they are put together correctly, should look like the puzzle you just saw. Only one set of pieces will not fit together to make the puzzle. The other six sets will. Find the set of pieces that does not fit together to make up the puzzle you just saw, wait for the red light, and then make your choice by pushing the button that has the number of your choice below it. (Subjects make choices.)

Each time listen carefully to the instructions. They will tell you what to do when each slide is presented.

Task No. 1 (Recognition)

On the next slide you will see one drawing. Look at it carefully. (20 seconds)

Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is just the same. Choose the drawing that is exactly like the one you just saw by pushing the button with the number of your choice. Remember, you cannot push the button until the red light comes on.

Task No. 2 (Recognition)

On this slide you again see one drawing. Look at it carefully. (20 seconds)

Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is just the same. Choose the drawing that is exactly like the one you just saw by pushing one of the buttons. Remember, you cannot push the button until the red light comes on.

Task No. 3 (Puzzle A)

The next two slides are puzzle tests. Look carefully at this first slide to see what the puzzle looks like when it is put together. (20 seconds)

On the next slide we see seven sets of pieces. Only one set of pieces will fit together to make the puzzle you just saw. Find the correct set of pieces and wait for the red light. You must choose only one set. If you are not sure, choose the set you think is best. Choose the set of pieces that will fit together to make the puzzle. Think carefully before pushing the button, for once you have pushed it you cannot change your answer.

Task No. 4 (Puzzle A)

On this slide you again see a puzzle that is put together. Look at it carefully. (20 seconds)

Now you see seven sets of pieces. Only one set of pieces will fit together to make the puzzle you just saw. Find the set of pieces that will make the puzzle and wait for the red light.

Task No. 5 (Puzzle B)

On the next slide you will again be shown a puzzle that is put together. Look at it carefully. (20 seconds)

Now you can see seven sets of pieces. These pieces, if they are put together correctly should look like the puzzle you saw. This time, only one set of pieces will not fit together to make the puzzle, the six sets will. Find the set of pieces that does not fit together to make up the puzzle you just saw. Wait for the red light, and then make your choice by pushing the button which has the number of your choice below it.

Task No. 6 (Puzzle A)

The next slide shows you another puzzle. Look carefully at this slide to see what the puzzle looks like when it is put together. (20 seconds)

Now you see seven sets of pieces. Only one set of pieces will fit together to make the puzzle you just saw. Find the correct set of pieces and wait for the red light before pushing the button. You must choose only one set. If you are not sure, choose the set you think is best.

Task No. 7 (Recognition)

On the next slide you will see one drawing. Look at it carefully. (20 seconds)

Now look at the next slide. On this slide you see seven drawings that look very much like the one you just saw. Only one of these is just the same. Choose the drawing that is exactly like the one you just saw by pushing the button with the number of your choice. Remember, you cannot push the button until the red light comes on.

Task No. 8 (Puzzle A)

The next slide shows you another puzzle. Look carefully at this slide to see what the puzzle looks like when it is put together. (20 seconds)

Now you see seven sets of pieces. Only one set of pieces will fit together to make the puzzle you just saw. Find the correct set of pieces and wait for the red light. You must choose only one set. If you are not sure, choose the set you think is best.

Task No. 9 (Puzzle B)

The next two slides are again puzzle tests. Look carefully at the first puzzle so that you may see how it looks when it is put together. (20 seconds)

Now you see seven sets of pieces. These pieces, if put together correctly, should look like the puzzle you saw. Only one set of pieces will not fit together to make the puzzle, the six sets will. Find the set of pieces that does not fit together to make up the puzzle you just saw. Decide on your answer, wait for the red light, and then make your choice by pushing the button.

Task No. 10 (Puzzle B)

On the next slide you again see a puzzle. Look at it carefully. (20 seconds)

Now you see seven sets of pieces. These pieces, if put together correctly, should look like the puzzle you just saw. Only one set of pieces will not fit together to make the puzzle. Find the set of pieces that does not fit together to make the puzzle you just saw, wait for the red light, and then make your choice by pushing the button.

Appendix F

Information Tasks and Experimental Instructions

On the screen in front of you, you will see a question. Read it carefully. (Allow 10 seconds.)

What is the longest river in the world?

Now look at the next slide. On this slide are seven answers to the question you just read. These are numbered one through seven. If you look at the panel in front of you, you will see seven red buttons numbered one through seven. Each button stands for each answer on the slide. Only one answer is correct. To tell us which answer you think is the correct one, you will push the red button above the number of the answer you have chosen. But you cannot push this button until you see the red light at the end of this row of buttons come on. Like this. After you have decided which number you are going to push, and while you are waiting for the red light, you will notice that some of the lights in the four rows of blue lights will come on. Like this. These blue lights tell you that your classmates are making their choices and you can see which choices they have made by simply checking the number below the blue light.

Now which of these do you think is the best answer for the question, "What is the longest river in the world?" Make your choice and wait for the red light to come on. When the red light comes on, push the button you have chosen. (Subjects make choices.)

As soon as you do this, a green light comes on above your choice. Remember, blue lights show your classmates' choices and the green lights show the choice you have made.

You can make only one choice. And once you have pushed the red button, your answer cannot be changed.

Be sure to answer each one carefully. If you don't know the correct answer, choose the answer you think is best.

We will do one more practice slide before we begin.

1. Yangtze
2. Missouri
3. Amazon
4. Mississippi
5. Nile
6. Volga
7. Mekong

Practice B

Read this question carefully. (Allow 10 seconds.)

Where was the composer, Wolfgang A. Mozart born?

Now look at the seven numbered choices. Decide on the answer you think is best and wait for the red light before pushing the button. (Subjects make choices)

We are now ready to begin.

1. Australia
2. Hungary
3. Estonia
4. Germany
5. Austria
6. France
7. Switzerland

Task No. 1

Read the question carefully. (Allow 10 seconds.)

What is the largest city in the world?

Decide on your answer and wait for the red light before pushing the button.

1. Calcutta
2. Moscow
3. Tokyo
4. New York
5. Peiping
6. London
7. Paris

Task No. 2

Read the question carefully. (Allow 10 seconds.)

Who wrote the well-known American song,

"Black is the color of my true love's hair"?

Decide on your answer and wait for the red light before pushing the button.

1. Carl Sandburg
2. Anthony Burke
3. an unknown folk song writer
4. Stephen Foster
5. Irving Berlin
6. Anton Dvorak
7. Sir Arthur Sullivan

Task No. 3

Read the question carefully. (Allow 10 seconds.)

Where is the country of Kwait found?

Decide on your answer and wait for the red light before pushing the button.

1. Europe
2. Australia
3. Russia
4. Asia
5. Africa
6. South America
7. Middle East

Task No. 4

Read the question carefully. (Allow 10 seconds.)

What is a storm in the Pacific called?

Decide on your answer and wait for the red light before pushing the button.

1. Cyclone
2. Tornado
3. Gale
4. Hurricane
5. Typhoon
6. Whirlwind
7. Squall

Task No. 5

Read the question carefully. (Allow 10 seconds.)

What is one deciliter equal to?

Decide on your answer and wait for the red light before pushing the button.

1. 4.8 square-yards
2. 2.41 inches
3. 10 grams
4. 100 cubic-centimeters
5. 25 marks
6. 5 ounces
7. 0.01 quart

Task No. 6

Read the question carefully. (Allow 10 seconds.)

Where are the Islands of Samoa found?

Decide on your answer and wait for the red light before pushing the button.

1. Gulf of Mexico
2. North Pacific
3. Mediterranean
4. Indian Ocean
5. South Pacific
6. North Atlantic
7. South Atlantic

Task No. 7

Read the question carefully. (Allow 10 seconds.)

What is the temperature on the surface of the sun?

Decide on your answer and wait for the red light before pushing the button.

1. 1000° C
2. 4000° C
3. 3000° C
4. 7000° C
5. 6000° C
6. 5000° C
7. 2000° C

Task No. 8

Read the question carefully. (Allow 10 seconds.)

Where is a town called Guastalla found?

Decide on your answer and wait for the red light before pushing the button.

1. France
2. Peru
3. Spain
4. Mexico
5. Italy
6. Argentina
7. Indonesia

Task No. 9

Read the question carefully. (Allow 10 seconds.)

Which of the following is not a book of
the Old Testament?

Decide on your answer and wait for the red light before pushing the button.

1. Jonah
2. Esther
3. Jude
4. Habakkuk
5. Isaiah

6! Ruth

7. Joshua

Task No. 10

Read the question carefully. (Allow 10 seconds.)

What is Karakatoa?

Decide on your answer and wait for the red light before pushing the button.

1. a Canadian river
2. a fish found in the Pacific
3. a Russian city
4. an Indonesian volcanic island
5. a Chilean mountain
6. an African politician
7. a movie made in New Zealand.

Appendix G

Control Instructions for Information Tasks

Practice A

On the screen in front of you, you will see a question. Read it carefully. (10 seconds)

Now look at the next slide. On this slide are seven answers to the question you just read. These are numbered one through seven. If you look at the panel in front of you, you will see seven red buttons numbered one through seven. Each button stands for each answer on the slide. Only one answer is correct. To tell us which answer you think is the correct one, you will push the red button above the number of the answer you have chosen. But you cannot push this button until you see the red light at the end of this row of buttons come on. Like this.

Now which of these do you think is the best answer for the question, "What is the longest river in the world?" Make your choice and wait for the red light to come on. When the red light comes on, push the button you have chosen. As soon as you do this, a green light comes on above your choice. This simply shows you what choice you have made.

You can make only one choice. And once you have pushed the red button, your answer cannot be changed.

Be sure to answer each one carefully. If you don't know the correct answer, choose the answer you think is best.

We will do one more practice slide before we begin.

Practice B

Read this question carefully. (10 seconds)

Now look at the seven numbered choices. Decide on the answer you think is best and wait for the red light before pushing the button. (Subjects make choices.)

We are now ready to begin.

Tasks No. 1 through No. 10

Read the question carefully. (10 seconds)

Decide on your answer and wait for the red light before pushing the button.

Appendix H

Research Publications Based on Data
Collected in Conjunction with
the Cooperative Research Project No. 2021

The following two summary articles are being prepared from the present final report to be submitted for professional publication.

Yamamoto, K. Creative thinking, sociometric composition, and task in a small-group experiment with fifth-graders.

Yamamoto, K. A note on fifth-grade children's vocational world and creative thinking.

The following five papers have been prepared on the basis of adjunct data collected in the course of the project. The content of none of these papers overlaps that of the present final report.

Yamamoto, K. Effects of restriction of range and test unreliability on correlation between measures of intelligence and creative thinking. _British Journal of Educational Psychology_, in press.

Yamamoto, K., Lembright, Marlene L., & Corrigan, Ann M. Intelligence, creative thinking, and sociometric choice among fifth-grade children. _Journal of Experimental Education_, in press.

Yamamoto, K., & Genovese, Caroline. Creativity and norm conformity in fifth-grade children.

Yamamoto, K., & Chimbidis, Maria E. Achievement, intelligence, and creative thinking in fifth-grade children: a correlational study.

Yamamoto, K., & Frengel, Barbara A. An exploratory component analysis of the Minnesota tests of creative thinking.